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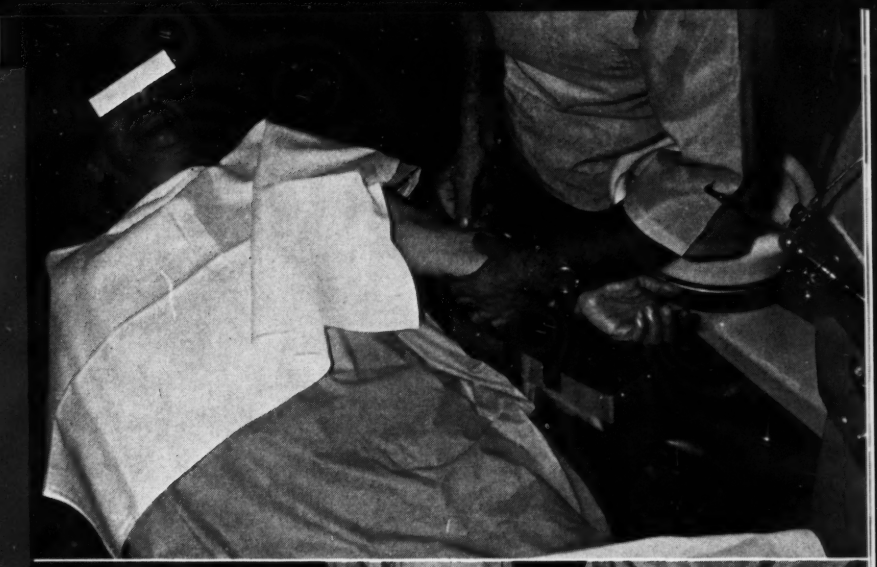

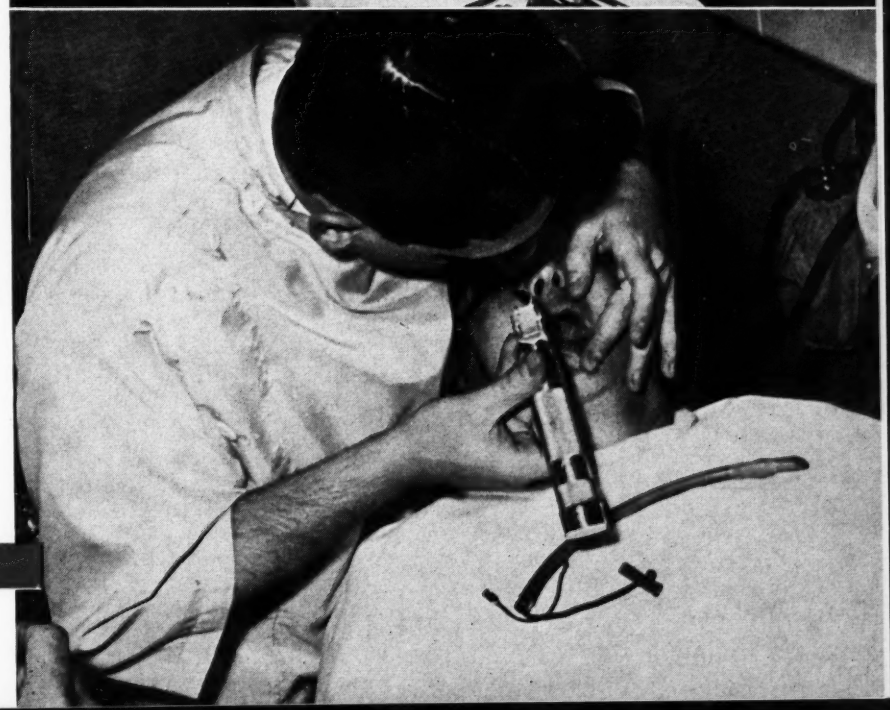

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HAROLD L. HAMBURG, B.S. (City College of New York, 1942), D.D.S. (New York University, College of Dentistry, 1946) is a general practitioner who has published previously in DIGEST. This month Doctor Hamburg presents GENERAL ANESTHESIA FOR THE EXTENDED DENTAL PROCEDURE.

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GENERAL ANESTHESIA

for the Extended Dental Procedure

HAROLD L. HAMBURG, B.S., M.S., D.D.S., Brooklyn, New York

DIGEST

Until recently ambulatory dental anesthesia was limited to treatments of short duration, for example, extractions and simple amalgam restorations. The value of both adult and pediatric mouth rehabilitation has become widely accepted. Patients who because of age or for emotional reasons, can not tolerate treatment under local anesthesia, can be treated extensively under a general anesthetic which permits the use of modern procedures, high speed, water spray, full mouth impression techniques. This article describes in detail a technique for general anesthesia which includes all these advantages.

Dental Office Preferred

Unless a hospital operating room is completely equipped as a dental office, dental procedures are more successfully performed in the dental office where the dental laboratory, x-ray, dark room, and other conveniences are available.

Author's Note: The photographs used to illustrate this article were made by Morris Frantz.

1 (top left).
Initial puncture into cephalic vein.

2 (top right).
One hundred per cent oxygen being administered as the Penthothal and the Anectine are infused. Atropine sulfate is being readied to be injected into the tube.

3 (bottom left)
Pharynx being examined. The lubricated tube is ready for insertion.

4 (bottom right).
Tube being inserted.

5 (top left). *Cyclaine being passed into the oratracheal tubes.*

6 (top right). *Tube coupled to machine. Cuff being inflated and closed off by rubber-tipped hemostat.*

7 (bottom left). *Mouth prop in place. Gauze pack inserted deep in pharynx.*

8 (bottom right). *Working personnel in their proper places. Dentist, anesthetist, aspirating nurse, and instrument nurse.*

Exception — Although it is more practical to outfit a dental office with all the equipment and personnel of the hospital, when advised by the physician that the patient's health or age warrants hospitalization, the anesthetist's opinion should be considered.

Unlimited Anesthesia Permitted— The following techniques were designed to maintain unlimited anesthesia while allowing the dentist the full use of all his dental techniques with full access to the oral structures, giving the patient reflex recovery within 5 minutes and the ambulatory faculty within an hour.

Requirements

Personnel — At the minimum the following assistants are necessary:

1. Anesthetist (fully hospital-trained physician or dentist)
2. Dentist (fully hospital-trained in anesthesia so that he can operate in coordination with the anesthetist)
3. Aspirating and retracting assistant
4. Instrument assistant
5. An associate anesthetist is a helpful addition to the staff and also a recovery nurse who combines the function of receptionist

Expendable Materials—The following medication is useful:

1. Ultrashort acting barbituate, Pentothal®, Surital®, Brevital®
2. Five per cent Dextrose
3. Anectine

9.
Reflex recovery simultaneous with termination of treatment.

10.
Recovery room.

4. Venopac® 78
5. Five per cent Cyclaine® liquid
6. Five per cent Cyclaine® ointment
7. Atropine Sulphate injectable or Scopolamine injectable

Equipment—The following instruments and equipment should be available:

1. Nitrous oxide-oxygen machine
2. Oratracheal tubes with cuffs, 28-36
3. Tube fittings with exhaling valve
4. Luer Syringes, 2 cubic centimeters—5 cubic centimeters
5. 18-gauge needles
6. Rubber aspirating tube
7. Aspirator
8. Tourniquet
9. Rubber-tipped hemostat

The Technique

Preoperatively the adult patient is given Nembutal,® grains 1½ and atropine sulfate grains 1/100, an hour and a half before treatment. He is instructed not to have any foods or liquids seven hours before. In all cases the patient must be accompanied by an adult. The following steps are then taken:

1. The patient is seated in the dental chair. The chair is tilted back while the feet are allowed to dangle on the sides. This is done to prevent the patient from using the foot-board as a fulcrum.

2. Using a Luer syringe with an 18-gauge needle, 1/100 grain of atropine sulfate is administered intravenously. The syringe is removed allowing the needle to remain in position.

3. Almost simultaneous with the removal of the syringe, the male end of the previously prepared venotube IV infusion set-up of 0.4 per cent Pentothal and 0.2 per cent Anectine is coupled to the canulating needle. (If the anesthetist prefers, he can make initial contact with the needle on the venotube and inject the atropine into the tube.) The needle and tube are taped securely to the arm and arm board.

4. The barbituate is allowed to drip at a rate of 60 drops per minute, until the first signs of unconsciousness occur (an indication is the loss of the eyelid reflex). The barbiturate drip is discontinued and the Anectine started at the same rate. This is continued until the respiratory muscles are completely paralyzed (cessation of voluntary respiration is the clue).

5. Until intubation is effected, oxygen is administered by means of a full face mask at the rate of 2 liters per minute.

6. At the point of respiratory muscle paralysis, the full face mask is removed and intubation initiated.

7. An oratracheal tube with an inflatable cuff, lubricated with 5 per cent Cyclaine ointment, shaped by a lubricated stilette (this facilitates the removal of the stilette), is introduced by direct vision aided by the laryngoscope. The cuff is inflated. Five cubic centimeters of 5 per cent liquid Cyclaine are introduced into the trachea via the tube. The Cyclaine reduces substantially the amount of Anectine the patient requires to tolerate the tube.

8. As soon as intubation is effected and the Cyclaine introduced, the tube is coupled to the gas machine with a controllable exhaling valve separating the gas bag and the tube.

9. The exhaling valve is left open with tension.

10. The rebreathing bag is squeezed at the rate of 12-16 times per minute at a pressure of 5-10 millimeters of mercury. This breathing rate for the patient is continued throughout the procedure. The mixture is 6 liters of nitrous oxide per minute, 2 liters of oxygen per minute.

11. All solutions are discontinued and dental treatment is begun.

Additional Measures

1. If the patient shows signs of waking, more barbituate is allowed to drip.

2. If there are signs of swallowing or lack of tolerance of the tube, the Anectine is introduced.

3. Anesthesia is maintained at the borderline of sleep and respiratory muscle paralysis.

4. The mouth prop is placed in position as soon as intubation is effected. A gauze pack is placed deep into the pharynx to prevent debris entering the esophagus or trachea.

Anesthesia Terminated—At the termination of treatment, the trachea is completely aspirated by means of a soft rubber aspirating tube. One hundred per cent oxygen is administered until voluntary respiration returns. The cuff is deflated, the tube removed. The oxygen is then continued with the full face mask until full reflex consciousness returns.

Comment — In this practice, orotrachea intubation has been more successful than nasotracheal. The occasional epistaxis resulting from the nasal tube produced so much inconvenience that it was decided that the minor interference of the oral tube was preferable. The lubricated tube brought about a relatively unimportant number of throat irritations.

Conclusion

With this technique, the dentist can use high speed with water coolant, take full mouth impressions without the concern of pulmonary complications or central respiratory collapse, without the problem of an excessively lengthy recovery time.

The apprehensive patient benefits from the most modern dental techniques, a minimum of visits, and the absence of former irritants.

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Interrelationship of Tooth Composition, Body Fluids, Diet, and Caries Susceptibility

ALBERT E. SOBEL, PH.D., Brooklyn, New York

THE EXPERIMENTS derived from a caries hypothesis based on changes in tooth composition led to the finding, confirmed in several laboratories, that soluble phosphate added to the diet is cariostatic. Careful evaluation of the finding, however, indicates that in addition to affecting tooth composition, a direct effect of phosphate within the oral cavity, such as neutralization of acids and decreased solubility of tooth mineral, could also bring about the cariostatic result. Investigation may, however, result in revision of the original hypothesis. It is hoped that future investigations will more closely define the mechanism through which the cariostatic effect of dietary phosphate supplements is accomplished.

Summary

Studies of the composition of diet with relation to composition of blood serum and the composition of the inorganic fraction of mineralized tissues led to the formulation of a caries hypothesis: High phosphate diets produce teeth which are less vulnerable to caries because their relatively low carbonate content renders them resistant to acid attack. Experimental work in this and other laboratories has borne out the fact that phosphate has a cariostatic effect. The present interpretation of this experimental evidence suggests that there are two ways in which this effect may occur: (1) increased phosphate in blood serum and saliva may alter the composition of the tooth; or (2) direct action of soluble phosphate in the saliva may reduce solubility of tooth mineral, as well as neutralize bacterial acids in the mouth.

Adapted from Publication, School of Aviation Medicine, USAF Aerospace Medical Center (ATC), Brooks Air Force Base, Texas (August) 1960.

How Hazardous is Dental Roentgenography?

ALBERT G. RICHARDS, M.S., Ann Arbor, Michigan

Conclusions

1. A survey of the dental and medical literature of the past forty years has failed to disclose any clinical evidence that would seriously condemn the practice of dental roentgenography when used in an intelligent manner, as being unsafe for either the patient or the dentist.

2. The few documented incidents of untoward biologic effects that have occurred in the past when dental patients were exposed to larger amounts of x-radiation are less likely to be repeated among the patients of today because of the far smaller amounts of x-radiation that presently can be employed.

3. There still are areas in which there is no clinical evidence that either proves or disproves that a correlation exists between a given dental exposure to radiation and a specific biologic effect. In view of this uncertainty, it is prudent to keep to a minimum the amount of ionizing radiation that a person receives from all artificial sources of radiation; therefore, each dentist should review his current roentgenographic procedures to see if his examinations could be made with less radiation.

From *Oral Surgery, Oral Medicine, and Oral Pathology* **14**:49 (January) 1961.

A NEW PHYSIOLOGIC METHOD

for Repositioning the Mandible—Part One

A. G. KRAMER, D.D.S.*, and SOPHIE KELNER, D.D.S.**, New York

DIGEST

Repositioning the malposed mandible is not in itself a permanent correction. It is essential that a method be provided for maintenance of the new correct position which has been established. In this series of three articles this particular problem in mouth rehabilitation is discussed. In this, the first installment, the author defines the motive for the perverse mandibular reflex patterns frequently seen and presents the important factors in repositioning.

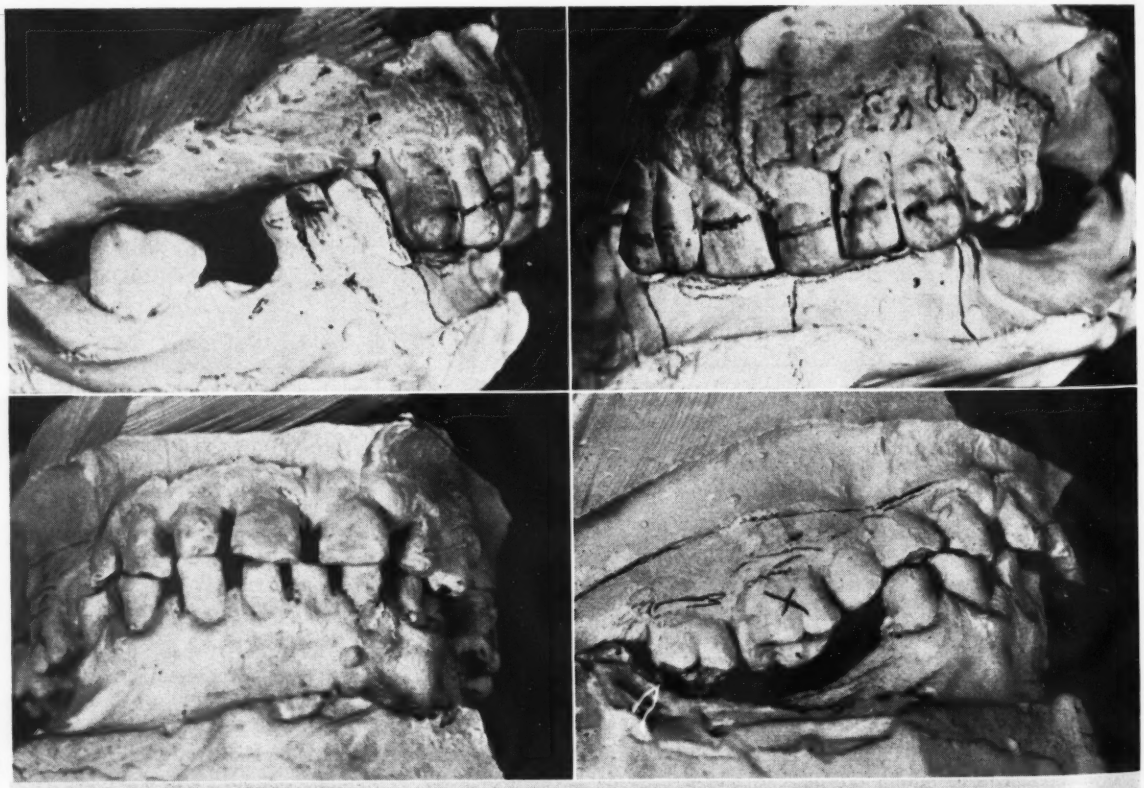
Classifications for Repositioning

Cases that give rise to pain syndromes due to temporomandibular joint dysfunctions or those which because of collapse (Figs. 1A, 1B, and 1C) defy any method of satisfactory approach to reconstruction, come within the classification of repositioning.[1,2,3,4]

Nonocclusion in Centric Closure—Most cases[5] that are collapsed present markedly depressed posterior teeth and deep overbites in the anterior segment with nonocclusion of the anterior teeth in centric closure.

Violent Contact Promoted—In many of these cases where occlusal contact in centric is maintained only by the teeth in the posterior segments, it is possible, through receptor organs which are built within the neuromuscular system and the periodontal membranes, for afferent impulses to incite a violent reaction in the musculature.

Due to nonocclusion (Fig. 2) the anterior teeth are permitted to extrude through continuous eruption of passive growth (Fig. 3). In protrusion the elongated anterior teeth (Fig. 4) take the bulk of stress because of their in-

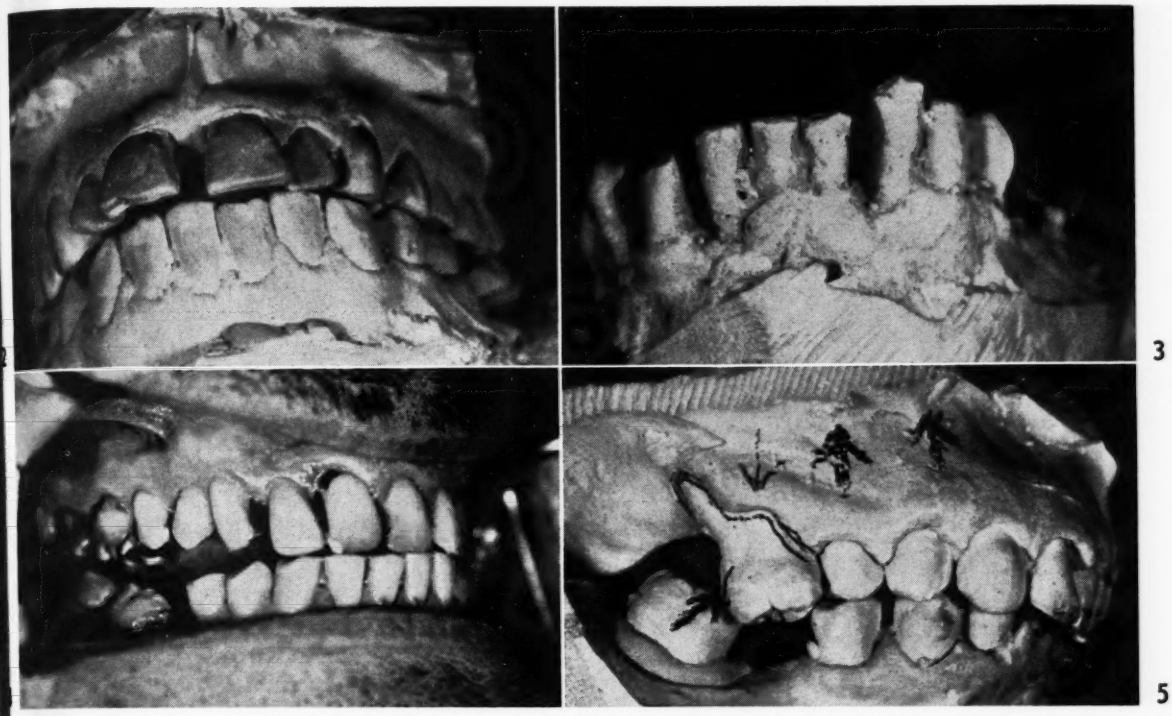


1.
Complete mandibular collapse. Continuous eruption of lower left cuspid and first bicuspid. Severe vertical overbite.

1A.
Severe vertical overbite. Continuous eruption of anteriors. Total imprisonment of mandible.

1B.
Bilateral collapse of posterior teeth. Fanning out of anterior teeth.

1C.
Total collapse, nonocclusion of anteriors (right side) resulting in continuous eruption (patient's right).



2.
Nonocclusion anteriorly permits continuous eruption.

3.
Continuous eruption of varying vertical levels.

4.
The mandible is in protrusion and the anteriors are taking all traumatic stress, creating periodontal breakdown. The posteriors are out of occlusion and not sharing in function.

5.
The posteriors are taking all traumatic stress in centric closure. Anteriors are in nonocclusion making continuous eruption possible. Deep vertical overbite causes traumatic imprisonment of the mandible.

creased vertical height and usually result in periodontal involvement, while the posterior teeth are taken out of function.

Nonocclusion of Anterior Teeth—In centric closure the reverse is true (Fig. 5); that is, the posterior teeth take the brunt of the masticatory force and the anterior teeth are in nonocclusion, thus not contributing at all in sharing the masticatory load.

Discussion

Although the mandible is capable of some voluntary motor control, it is essentially a reflex organ.[6] When all segments of the mouth, anterior and posterior, are in proper relationship the neuromuscular system is considered to be in an excellent state of physiologic tonicity, balance, or equilibrium. Should there be, however, interference by a single tooth or several teeth, the proprioceptor signalors, particularly those found in the periodontal membranes of the interfering teeth, create through afferent impulses a violent increase in electrical potential in certain muscles of mastication. This results in a shift of the jaw to a new position of relative comfort in order to avoid prematurities and interferences.

Motive for Adopting Eccentric Pattern—It is apparent that the mandible has adopted an eccentric pattern of function for the sake of temporary comfort and convenience. If not corrected, however, this eccentric position becomes acceptable to the patient and through constant usage becomes the predominant or the so-called functional centric.

Eccentric Function Accepted—It is evident that the mandibles of these patients are in a malposed position or eccentric function. It has been the custom to accept eccentrically placed mandibles and to utilize these perverted reflex patterns as the basis for critical measurements, such as vertical dimension, physiologic rest position, centric, freeway space.

New Closing Patterns Can be

Author's Note: Gratitude is expressed to William Gertzman, D.D.S., member of the Visiting Staff in Surgery, Lutheran Hospital, and to Morris Fierstein, D.D.S., Director of Dentistry, Thoracic Division, Queens Hospital Center, for their encouragement and help in presenting this work to the dental profession. The drawings for the second installment were made by Judy Rosenberg.

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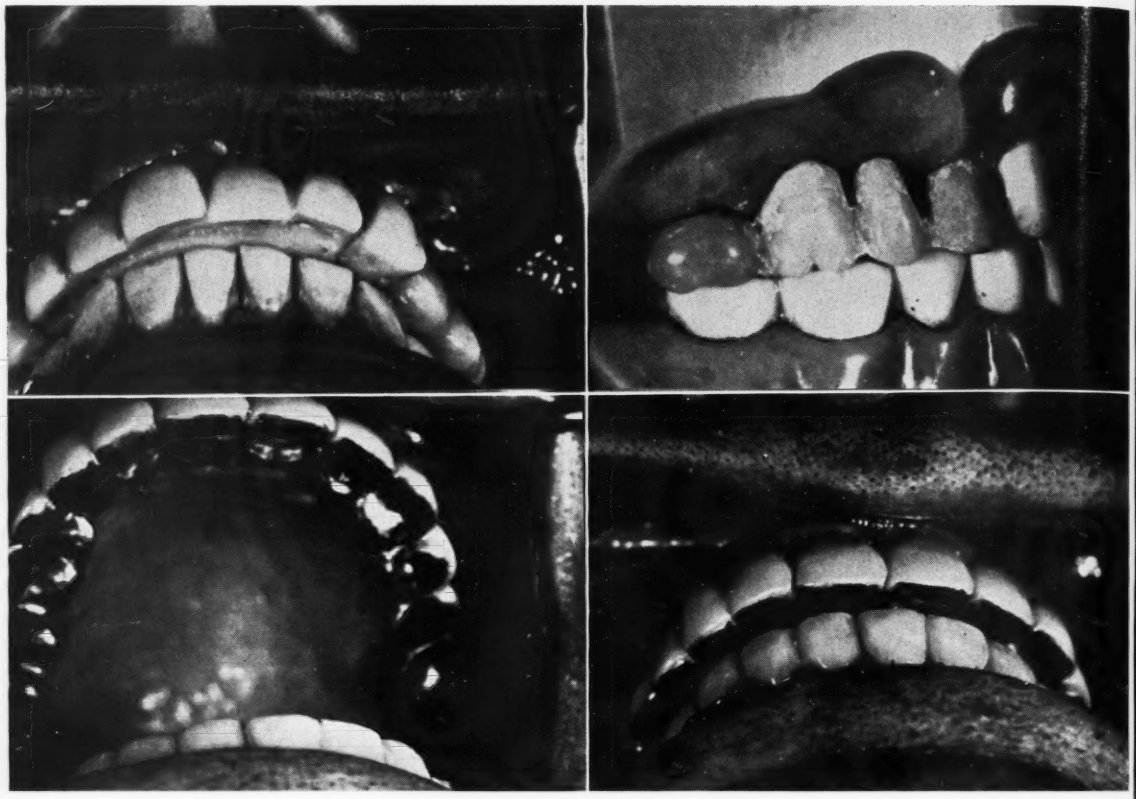

6.
Anterior fixed (temporarily cemented) aluminum acrylic bridge with built-in bite-plane lingually.

7.
Posterior aluminum acrylic temporary bridge.

8.
Anterior cast veneer crown with cingulae properly placed to receive the incisal edges of the lower in centric closure. This stabilizes the repositioned mandible and arrests continuous eruption.

9.
Lower incisors are contacting cingulae of uppers. Labial inclination of incisors assures freedom of movement to mandibular teeth.

Learned—Moyers[7] states, "It may be good clinical practice in a badly broken down mouth to teach the person to close on a new closing pattern which has never been used because the ones which have been used have been so frustrating." Walsh[8] states, "Patients must relearn a long forgotten neuromuscular pattern or learn a new one. Some patients need more than one stage to affect this gradual alteration in functional position because the habit pattern must become an unconscious conditioned reflex."

Correction of Perverted Pattern Necessary—It is the author's opinion that precisely as the jaw can move into malposition through its perverse process, it can also shift into its own physiologically correct position if an opportunity is provided. It is this dominant, perverted neuromuscular pattern and its concomitant malpostured mandible with its sequelae of pain, violence, and destructiveness which must be corrected.

Important Factors in Repositioning

In the procedure for mandibular repositioning presented here the remaining upper anterior teeth are utilized, preferably from cuspid to cuspid, to construct a fixed bridge made of an aluminum shell and acrylic with a bite-plane incorporated into its lingual aspect.

Physiologic Position Corrected—When finished the bridge is cemented with a temporary cement (Fig. 6). In this way the neuromuscular system is permitted to guide the jaw into a corrected physiologic position by suspending proprioception posteriorly. The posteriors are taken out of occlusion and the patient is permitted to function only on the anteriors with the incisal edges of the lowers making contact with the bite-plane of the uppers at a newly established physiologic vertical level. This is only for a *temporary period* during which repositioning occurs in a vertical, horizontal, and anteroposterior plane because of release from muscular violence resulting from noncontact of the posterior teeth.

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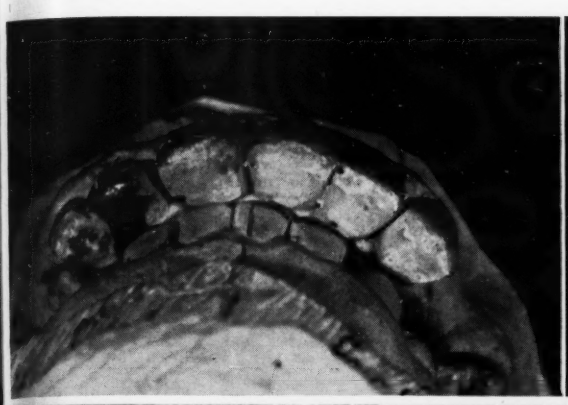

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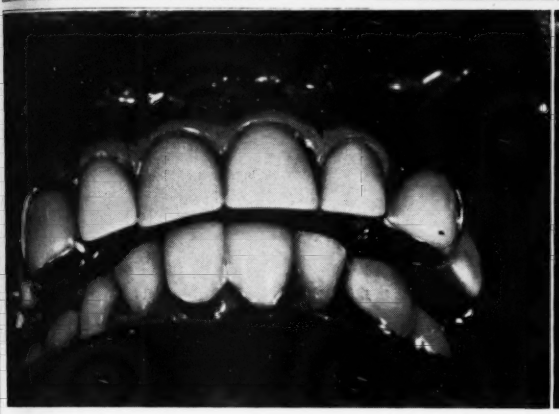


12A

10.
Class II, Division 1. Complete collapse. Considerable horizontal overjet. Deep vertical overbite.

11.
Same case as shown in Figure 10 after repositioning. Note precision recesses in castings ready to receive removable appliance with built-in bite-plane.

12.
Appliance in position. Lower anteriors in occlusion with bite-plane in centric closure.

12A.
Appliance in position showing bite-plane.

Temporary Maintenance—After the established position has been obtained in the temporary phase the maintenance of the correct position is achieved posteriorly through the use of aluminum acrylic bridges (Fig. 7), and anteriorly through the use of the bite-plane (Fig. 6).

Permanent Maintenance of Correct Position—In the permanent restoration, however, maintenance is achieved posteriorly by means of fixed cast units and anteriorly by the use of cast veneer crowns (Fig. 8) that carry a *cingulum* placed in relationship to the incisal edges of the lower anterior teeth in centric closure, to prevent further *continuous eruption* or passive growth (Fig. 9).

Measures to Correct Exaggerated Retrusion—In the markedly retrusive jaw Class II, Division 1 (Fig. 10) it is necessary to make precision recesses in the cast upper anterior cuspid cingulae and in the posterior castings (Fig. 11) carrying a removable appliance with a *built-in bite-plane* for contact with the retruded lower anterior teeth both in centric and eccentric positions (Figs. 12 and 12A).

(End of Part One)

57 *West* 57*th Street*

Biochemical Individuality

The more extensive our knowledge of the differences in biochemical make-up between different normal persons becomes, the more likely are we to begin to understand why people react differently from one another in similar environments, and why some people are more susceptible than others to particular types of clinical disorder. The idea of diathesis is an old one in medicine, but it has always been nebulous.

From *Lancet* No. **7178** (March 25) 1961.

Active Border Seal:

AN IMPRESSION PROCEDURE FOR IMMEDIATE DENTURES

VICTOR ZATZ, New York

DIGEST

The steps of the immediate denture impression technique are the same as those for the edentulous impression described in the March 1961 issue of DENTAL DIGEST and in the book, "The Active Border Seal." For this reason the special provisions for treating the remaining teeth to avoid interference with taking the impression and their inclusion in the final impression are described and illustrated in this article.

General Considerations

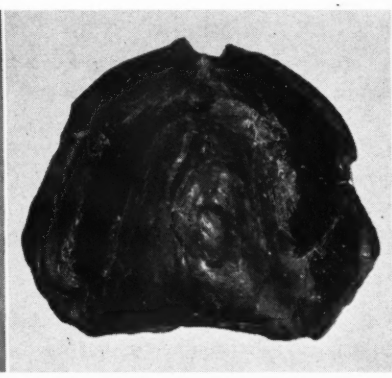
Immediate dentures are frequently designed to be worn for a short time before construction of the final denture is undertaken. The only reason for this procedure is that the practitioner does not possess an exact technique which will enable him to construct a final prosthesis in the first place.

Rebasing Procedures May be Inadequate—In many cases the immediate denture is ultimately rebased to serve as the final denture. The rebasing of a poorly fitting denture, however, will not necessarily convert it into a stable and retentive prosthesis. The rebasing procedures in general use cannot be considered precise methods for the correction of the inaccuracies of the improperly fitting denture. Rather, they are frequently responsible for additional inaccuracies.

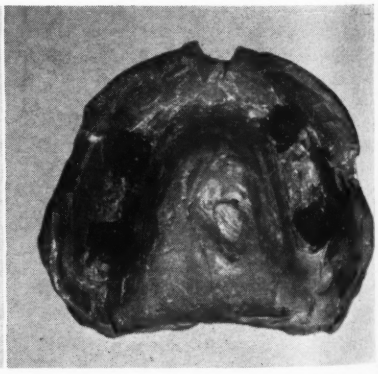
Postinsertion Problems—Basically, the problems of insufficient retention and stability encountered by the dentist, whether it is an "immediate temporary" or a final prosthesis are inevitable results of oversimplified impression techniques. This is equally true of the oversimplified impression techniques widely used for denture rebasing.

Stability and Retention Required—The requirements for a stable and retentive prosthesis are equally important in the construction of an immediate prosthesis. The value of a precision impression procedure is therefore fundamental to the success of the complete denture and is particularly well illustrated in the construc-

1.
A compound primary impression. The impression was correctly centered. All borders are well registered. A rapid muscle-trimming by the patient's voluntary, functional movements created imprints of labial and buccal frenums. These imprints will guide the operator in the reshaping of this impression into a "jaw-form" — an anatomically correct, compound impression tray.



2.
The primary impression. All borders were shortened 3 millimeters (underextended). All undercuts were removed from the impression walls. Additional compound was removed from the walls to make this "jaw-form" oversize for lateral freedom in reseating the impression and to create space for an ample amount of alginate to be used within this "jaw-form."



3.
The primary impression. Four wax stops, each 3 millimeters high were placed on the ridge areas. This oversized impression, plus the four stops, will keep the compound out of contact with all tissues. Thus, the alginate that will be used over this compound "jaw-form" as the impression material of choice, will register a true mucostatic impression.

4 and 5.
Photographs of the same stone cast, the result of the mucostatic, alginate impression. The remaining teeth are blocked off with plaster. This provision will eliminate interference in seating the acrylic denture base impression which will be processed on this cast.

6.
The wax pattern for the acrylic denture base ready for flasking. A double thickness of base wax was used over the postdam region of the cast. This is important. The postdam area of the denture base must be made rigid to avoid distorted results in the development of the compound postdam. Note the base handle shown in Figure 9. It is placed at a 45-degree angle. In this position it will not interfere with the movements of the lip during the compound border seal procedure. Should the height of the handle interfere with the closing of the flask it is removed from the wax base and placed in the same flask, next to the model. After processing, the handle is reattached to the base with cold-cure acrylic. Note that regular denture acrylic should be used to process the acrylic denture base impression. It also must be processed full curing time.

tion of the immediate full denture.

The Maxillary Impression

First Sitting—The following steps are taken:

1. A snap compound impression is made and is converted into a "jaw-form," an anatomically correct compound impression tray. The only additional step required is the enlargement of the areas involving the remaining teeth (Figs. 1, 2, and 3).

2. The enlarged areas will permit unobstructed reseating of the "jaw-form" when alginate is used within it to complete the primary mucostatic impression.

3. The remaining teeth are blocked off with plaster (Fig. 4) on the stone model obtained from the mucostatic impression (Fig. 5).

4. A denture base is processed on this model as shown in the wax pattern ready for flasking in Figure 6.

Second Sitting—The acrylic denture base is tested. Its borders are checked for underextension. The base is now ready for border muscle trimming with compound.

Processed Acrylic Base — Note in Figure 7 the enlarged areas for the remaining teeth. This will provide freedom for seating and removal of the denture base in the creation of the compound border seal and postdam.

Denture Base — In Figure 8 the acrylic hoods covering the remaining teeth are shown. This complete coverage will keep the air out permitting continuous testing of the impression, during and upon completion of the compound border seal and the postdam. (The bases were photographed before border trimming.)

Bases Completed—The compound border seal and the postdam are completed as shown in Figures 9 and 10.

Hoods Perforated—The hoods over the remaining teeth are perforated as shown in Figure 11. This permits escape of the surplus alginate that will be used within these hoods to complete the impression.

Impression Completed — The alginate impression of the remaining teeth is shown in Figure 12. The final impression is now completed. (No wash of any kind is used in this technique.) Any alginate that may spread over the denture base beyond the areas being restored with the alginate impression must be removed before pouring the cast. (The denture base is the completed impression of the seating area.) The impression is boxed, a stone cast is poured, and the denture base impression is discarded.

The Mandibular Impression

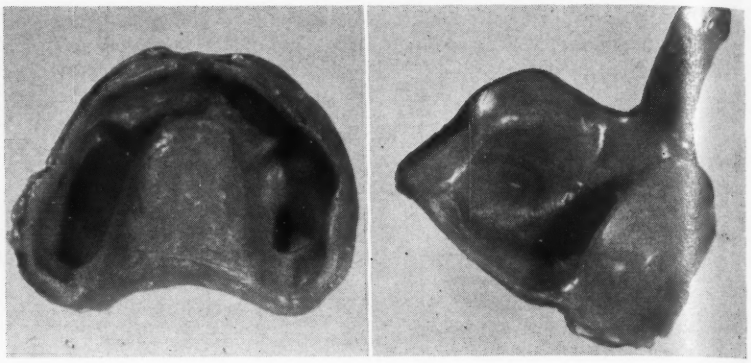
First Sitting—The steps for the immediate denture impression are the same as those used for the edentulous impression. The provisions for treating the remaining teeth to avoid interfering with impression making are the same as those described for the maxillary impression.

Second Sitting, The Compound Border Seal and the Sublingual Extension Procedure—The steps in this procedure are the same as those taken for the edentulous impression.

Steps Repeated—The provisions for treating the remaining teeth, and their inclusion in the final impression, are the same as those of the maxillary impression previously described.

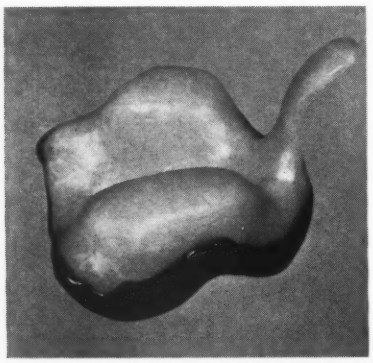
Final Steps—Figures 13 and 14 illustrate an impression ready to receive alginate for the registration of the remaining teeth. This final step completes the mandibular impression. The hoods over the remaining teeth keep the air out.

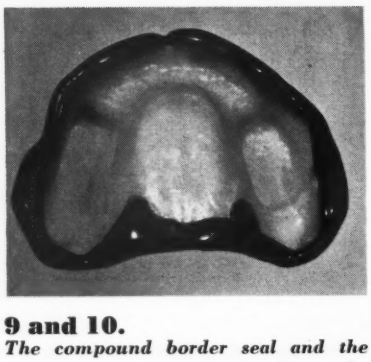
Figure 15 illustrates perforations in the hood over the remaining teeth. This will permit escape of surplus alginate that will be used to complete the impression. Figure 16 shows a completed mandibular impression. Note that Figures 13, 14, 15, and 16 are impressions of two different mandibles, 13 and 14 are impressions of one, 15 and 16 are of another.



7 and 8.
Processed acrylic denture bases. The enlarged areas for the remaining teeth provide freedom for seating and removing the impression bases during development of the compound border seal procedure and postdam. The solid hoods over the remaining teeth serve to keep the air out. This arrangement will permit accurate testing of the completed impressions to determine the degree of retention the ultimate dentures will provide. (The bases were photographed prior to the trimming of the borders underextended.)

Excess Alginate Removed—Any alginate that may spread over the denture base, beyond the areas being restored with the alginate impression, must be removed before pouring the cast.





9 and 10.
The compound border seal and the postdam are completed. Note the smooth "polished" condition of the compound borders. When the low fusing compound used for this purpose is sufficiently softened, the functioning musculature and tissues will automatically develop smooth compound borders. A diligent adherence to the procedures of this technique will create superior complete denture results.

Discussion

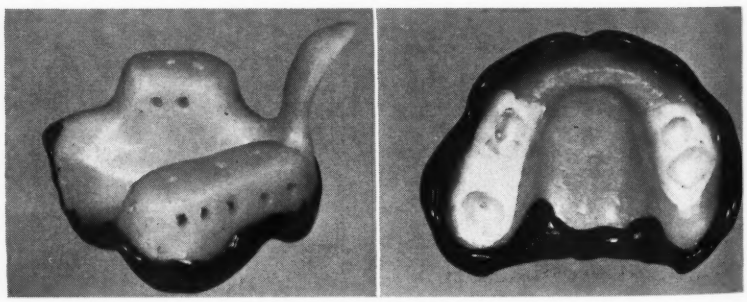
Although it is suggested that the addition of the sublingual extension be done only when the compound border seal is deemed insufficient for the retention of the prosthesis, in the simplified method presented this important retentive factor is included routinely in every impression.

Vital Retentive Area of Mandible—This is the buccal area from the second bicuspid to the distobuccal angle. The importance of developing *maximum width* border rolls in this effective, retentive area cannot be overemphasized.

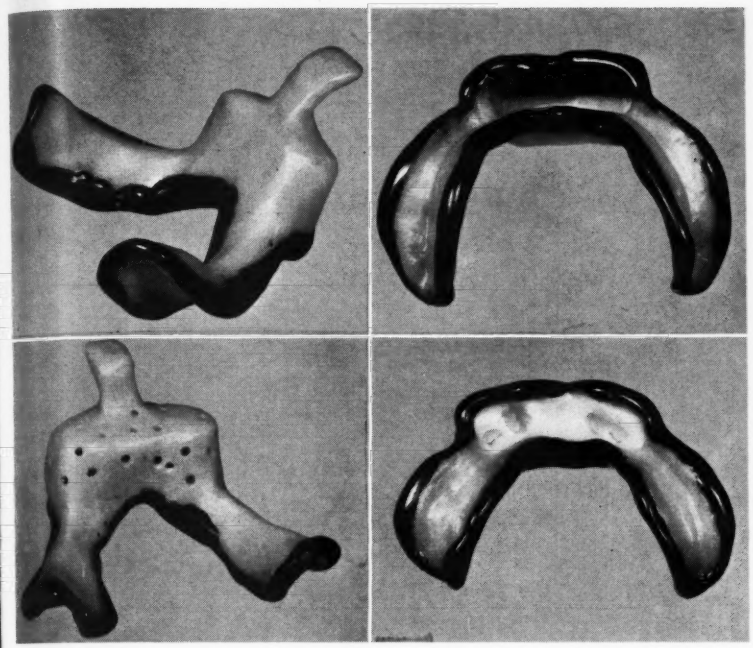
Problem in Retention—To the majority of dentists the mandibular denture poses a difficult problem of retention. In the absence of a scientific formula to serve as a guide for the correct termination of the edentulous impression's borders, the greater number of impressions seen are simultaneously over and underextended in different border zones. This also applies to the peripheries, thin and heavy in different areas, but not necessarily in the right ones.

Opposing Concepts—Although one group of dentists may believe that peripheries should be heavy, another group insists on uniformly thin borders. These diametrically opposite concepts reflect the uncertainties and the inadequacies of the various impression techniques in common use.

Effective Border Seal Secured—The dimensions of the border extensions of the impression, and the width of



11 and 12.
The completed maxillary impression. The hoods over the remaining teeth are now perforated to permit the escape of excess alginate which was used to complete the impression (Fig. 11). A small amount of alginate is used to fill the enlarged areas for the remaining teeth. The impression is reseated, no functional action is required. Upon removal of the impression, any alginate that may spread over the denture base beyond the areas being restored with the alginate impression, is removed prior to pouring the stone cast. It should be remembered that the denture base is the completed, mucostatic impression of the seating area. The compound used to create the border seal, therefore, should be a continuation of the denture base borders. Any compound that may spread over the tissue side of the denture base must be removed. Similarly, the alginate should be confined to the impression areas being restored with it. The impression is boxed in to preserve the fullness of its borders and the postdam. A stone cast is poured; the denture base used to make the impression is discarded.



13 and 14.
The mandibular impression. The compound borders were completed. The hoods over the remaining teeth keep the air out. This provision permits an accurate test of the border seal of the completed impression.

15 and 16.
Photographs of the same impression; (but not of the same mandible as shown in Figures 13 and 14). The mandibular impression is completed. Alginate was used to restore the remaining teeth as previously described. Surplus compound and alginate were removed. The impression will now be boxed in to preserve the fullness of its borders. A stone cast will be poured and the denture base will be discarded. It should be pointed out that the borders of the processed denture must not be trimmed, finished, or polished. Any rough spots seen on the peripheries may be carefully smoothed with a rubber wheel. The goal is to maintain the borders exactly as developed on the impression. Only thus can the effectiveness of the border seal be fully preserved.

the peripheries must be established by the patient's voluntary, unobstructed functional movements. The condition of the peripheries will then be heavy rolls in some areas, thinner borders in other zones, accurately representing the conditions of the mucolabial and the mucobuccal folds in function. In this way the practitioner can secure an active and effective border seal to provide the necessary retention for the ultimate denture.

Aid to Retention — The technique presented through its precise procedures, has demonstrated that many buccal border rolls, previously deemed sufficient by the operator, were actually inadequate. Repeated additions of soft compound doubled their width. This increased width proved to be an additional aid to retention.

Static Area of Mucobuccal Fold—It should be remembered that as long as the borders of the denture base are sufficiently underextended and the compound used is soft, the surplus will invariably be removed by the functional movements of the musculature and the border tissues. The remaining wide buccal roll represents the static area of the mucobuccal fold.

Rebasing Technique

If the amount of ridge removed in surgery is later seen to exceed that which was removed in trimming the cast, and it is desired to reconstruct the areas involved, cold, fast curing acrylic permit accurate "local rebasing."

1. Rebasing can be performed by the dentist in the office directly in the mouth. This method of individual area rebasing lends itself to considerable accuracy and the operator is in complete control of the desired results.

2. The surplus acrylic that spreads beyond the areas involved is removed while the acrylic is still soft.

3. Setting can be retarded by having the patient rinse the mouth with cold water before inserting the denture containing the cold cure acrylic.

4. Upon removal of the denture, cold water is poured over the acrylic to keep it sufficiently soft during the removal of the surplus and the final reseating of the denture. Accurate rectification and restoring fit of dentures is accomplished with minimum effort.

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Prevention of Dental Caries

THERE IS little doubt that caries can be prevented to a large extent by the elimination of our so-called "civilized diet." Unfortunately, the attractiveness and cheapness of modern refined foods make this an impracticable solution. In future, artificial fluoridation of the water supplies and possibly the use of therapeutic dentrifrices may be shown to be safe and effective measures which could be easily applied on a large scale. In the meantime, the incidence of caries can be reduced by a combination of methods which are acceptable to many people. Especially important are the restrictions of eating between meals, thorough tooth-brushing and mouth rinsing, and advice and treatment suitable for the individual patient by dentists experienced in preventive measures.

From Editorials, *British Medical Journal* No. **5221**:264 (Jan. 28) 1961.

COSMETIC REPAIR

*for Retrusion of the Mandible**

JOHN B. ERICH, D.D.S., M.D., Rochester, Minnesota

DIGEST

Retrusion of the mandible, with recession of the chin and posterior displacement of the lower teeth, presents an abnormal relationship between the upper and lower jaws which produces a conspicuous external disfigurement. This deformity gives the impression of timorousness, an appearance to which many persons thus afflicted are extremely sensitive. This facial defect is to be distinguished from a simple receding chin, which is associated with essentially normal dental occlusion and is easily rectified by the insertion of cancellous bone, over the anterior aspect of the mandible, taken from the crest of the ilium. Marked retrusion of the lower jaw presents an altogether different problem; unfortunately, the methods of correction of such a deformity may be complicated and the patient is discouraged by the prospect of extensive surgical treatment. Simplified methods of treatment may not be faultless, but they are commendable and are especially appealing to the patient.

1A (top left).
A retrusion of the mandible of unknown cause, but probably of congenital origin. The teeth were in fairly satisfactory occlusion, but there was marked recession of the chin.

1B (top right).
Deformity corrected by surgical preparation and skin-grafting of an intra-oral pocket between the chin and mandible, into which pocket a prosthesis was inserted.

2A (bottom left).
Marked retrusion of the mandible of unknown cause but probably of congenital origin. Posterior displacement of the lower teeth was not marked, but retrusion of the chin was severe.

2B (bottom right).
External deformity corrected by surgical preparation and skin-grafting of an intra-oral pocket between the chin and mandible, into which a prosthesis was inserted.

Causes

Significant mandibular retrusion involves two sets of etiologic factors:

1. Bony hypoplasia caused by arrest in growth of the lower jaw as a result of congenital factors, birth injuries, osteomyelitis, temporomandibular ankylosis or unreduced fractures, and especially bilateral subcondylar fractures.

2. Dental malocclusion. Any factor which disturbs the growth of the mandible in childhood will interfere with natural dental occlusion and, as the teeth erupt in a state of malposition, the deformity becomes more and more accentuated.

Various Measures Employed

The correction of marked posterior displacement of the lower jaw involves surgical procedures which restore the chin to an acceptable contour and the occlusion to a normal relationship. A bilateral step osteotomy of the body of the inferior maxilla in which the anterior fragment is brought forward to establish a more nearly normal contour for the chin has been described. Some surgeons have recommended osteotomy of both rami, a procedure

*From the *Mayo Clinic*.

3.
Surgically prepared intra-oral pocket between the chin and mandible, lined with a split-thickness skin graft.

4.
Prosthesis inserted into the skin-lined pocket as shown in Figure 3 to establish normal contour for the lower lip and chin.

which permits the surgeon to shift the mandible anteriorly.

Jaw Advancement Insufficient—No matter which of these surgical techniques is employed, usually no more advancement than 1 centimeter is provided for the lower jaw. Attempts to bring the mandible farther forward than 1 centimeter would exert undue traction on the inferior alveolar nerves and would not provide enough contact between the bony fragments to ensure good union. Moreover, the posterior displacement of the lower jaw of most patients who seek surgical treatment for this type of deformity exceeds 1 centimeter.

Imperfect Cosmetic Result—Building up the chin with cartilage or bone grafts has been advocated. This form of treatment does not produce a completely acceptable cosmetic result because it leaves the lower anterior teeth in marked lingual occlusion, and the lower lip continues to be drawn back by its mucosal attachment to the tissues of the gums surrounding the lower anterior teeth.

Minimum Surgical Requirements—It would seem that an effective cosmetic result obtained by a comparatively simple technique requires surgical detachment of the lower lip and soft tissues of the chin from the anterior aspect of the mandible. This procedure leaves an intra-oral pocket which is lined with a split-thickness skin graft. Subsequently a prosthetic device is introduced to hold the lower lip and chin forward in normal position (Figs. 1 and 2). If necessary, artificial lower anterior teeth can be used in the prosthetic appliance to establish a more nearly normal relationship between the upper and lower dental arches.

Technique

To free the lower lip and chin from their attachments to the lower jaw, sharp dissection is employed:

1. An incision is made through the mucous membrance of the labio-alveolar sulcus from one bicuspid region to the other.

2. The incision is carried down between the alveolar process and the lower lip, to and around the lower border of the mandible, care being taken not to injure the nerves from the mental foramen.

3. The result of this procedure is the creation of a pocket which must be lined with skin for the reception of the appliance (Figs. 3 and 4).

Cavity Lined with Skin—The problem which arises in the skin-grafting of such a cavity is the difficulty encountered in immobilizing the adjacent tissues during the period of healing. The simplest method of grafting such a pocket is the following:

1. A sponge-rubber mold, shaped so that it will fit snugly into the pocket, is prepared to be used as a stent.

2. A thin split-thickness skin graft, shaved from the abdomen preliminary to the intra-oral operation, is wrapped completely around the sponge-rubber stent and is sutured along the upper surface of the mold.

3. The stent covered with the skin graft is inserted into the intra-oral pocket, the opening of which is firmly sutured with chromic-catgut mattress stitches.

4. Adhesive tape applied externally helps to immobilize the soft tissues of the chin and lower lip. After 7 to 8 days the pocket is reopened and the stent is removed, so that the skin-lined cavity is exposed (Fig. 3).

Prosthesis Utilized

Prior to the operation in such cases it is well to have a dentist prepare a portion of the prosthesis which ultimately is to be employed. If the patient's dental occlusion is not too abnormal, artificial teeth need not be used on the final appliance; the dentist can prepare a metallic device with clasps which has an anterior bar extending downward below the patient's lower anterior teeth.

Method of Use—(1) Immediately after preparation of the intra-oral pocket, the metallic splint is clasped to the teeth in the proper position, with the anterior bar extending into the artificial cavity below.

(2) Dental compound softened by heating is packed into the pocket and around the bar.

(3) When the compound is hard, the compound and appliance are removed and sent to the dental laboratory for processing in one of the acrylic materials.

(4) If this routine is followed the completed prosthesis will be ready for insertion as soon as the sponge-rubber stent is removed from the skin-lined pocket (Fig. 4).

Extraction of Teeth May Be Necessary—If the patient's lower anterior teeth occupy a position of marked and conspicuous posterior displacement, it is advisable to extract the teeth; they can be replaced by artificial teeth on the prosthesis. In this situation, before the intra-oral operation is undertaken, the patient's lower anterior teeth are extracted and the dentist prepares a removable partial lower denture in order to establish normal dental occlusion.

Artificial Teeth Part of Prosthesis—As soon as the intra-oral pocket has been made ready, softened dental compound is packed into the cavity and is attached to the denture. When hard, the compound is processed in one of the acrylic materials to become a permanent part of the prosthesis, which is ready for insertion as soon as the intra-oral pocket has been lined with skin.

Comment

It is most important that the intra-oral prosthesis be inserted as soon as the sponge rubber stent is removed. Otherwise, the pocket will contract within a matter of 30 minutes or less to a point at which the appliance cannot be introduced. Moreover, the prosthesis must be worn for several months before the walls of the pocket will not contract.

Post-procedure Measures

1. For a few days after the prosthesis has been introduced into the mouth the lower lip often is stretched and tense, and has a tendency to contract downward. To counteract this reaction, adhesive tape must be used to hold the lower lip in the desired position.

2. In some cases the lower lip is so short and tense that it will not meet the upper lip; under such circumstances rubber-band traction from adhesive tape on the lower lip and chin to a head bandage above is required to stretch the lower lip upward to a desirable position, an action which requires 5 to 6 days.

3. Lapse of 2 or 3 months is necessary for the muscles of the lower lip to develop sufficiently for the lower lip to lose its tense appearance. Moreover, the prosthesis usually will have to be ground off at indicated sites to create a desirable contour for the lip and chin.

Cooperation Required

It should be emphasized that correction of a receding chin and lip caused by mandibular retrusion requires close cooperation between the plastic and dental surgeon. Creditable results, however, can be obtained in such cases with a minimal amount of surgical intervention.

Adapted from *Proceedings of the Staff Meetings of the Mayo Clinic* **36**: 180 (March 29) 1961.

Electrical Anesthesia

IT IS tempting to speculate upon the place which electrical anesthesia may eventually be assigned in the armamentarium of the anesthesiologist, should further trial and development render it safe for routine clinical use. Clearly, it should reduce the period of observation, necessary after general anesthesia for relatively minor operations, after which the patient may be discharged. The fact that preliminary endotracheal intubation is necessary detracts somewhat from the facility with which the method can be applied, but intubation is now utilized with other forms of general anesthesia in most instances. Dental extractions, animal work, burn dressings, short operations under conditions of field warfare—these come to mind as circumstances in which brief anesthesia with minimal systemic or prolonged effects is especially desirable. Under mass casualty conditions a battery of electronarcosis machines might be managed in a large operating room by a single anesthesiologist, with the assistance of less extensively trained personnel. A small and compact unit could perhaps be devised. It would seem, therefore, that clinical electronarcosis opens new vistas in the approach to anesthesia and above all, in the approach to clinical neurophysiologic research.

From Editorials, *Journal of the American Medical Association* **175**:606 (Feb. 18) 1961.

The Cross Subgingival CALCULUS EXPLORER

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DIGEST

This article describes an instrument especially designed to locate subgingival calculus. The component parts of the instrument and the manner in which it can most successfully be used are defined.

Necessary Measures

The removal of subgingival calculus is recognized as essential in the treatment of chronic gingivitis and periodontitis. Yet it is suggested that unless the following measures are possible during the procedure the dentist will not be able to determine positively whether he has removed all the subgingival calculus deposits and planed the root smooth.

(1) It must be possible to detect the subgingival calcareous deposits before scaling.

(2) Progress during the scaling procedure must be checked.

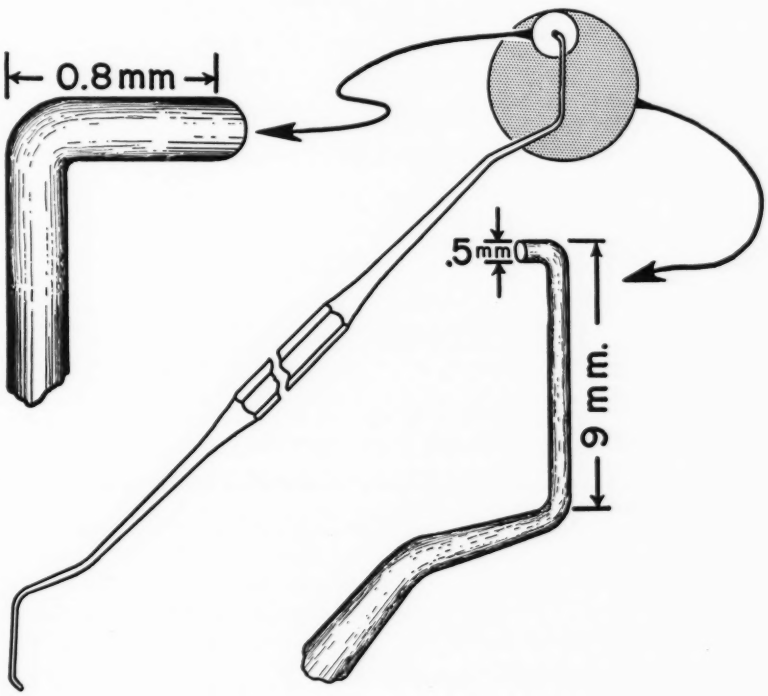
(3) The texture of root surface must be carefully felt following scaling.

The Instrument**

The only explorer specifically designed for this purpose is described by Cross.[1] It is a double ended instrument, fine enough to be introduced below the gingival margin, without undue trauma to the gingivae (Fig. 1). The working end of the instrument extends 0.8 millimeters from the shank of the instrument, and has a round flattened tip 0.5 millimeters in diameter. It is blunt at the end so that the instrument will not stick or catch in the cementum, yet fine enough to transmit various tactile sensations to the fingers. It should be held lightly and passed along the root surface, so that the blunt edge is against the tooth (Fig. 2). All surfaces of a tooth require exploration for subgingival calculus.

Manner of Use—In exploring the subgingival areas, the explorer is passed down the side of the tooth with the end of the explorer against the tooth until the bottom of the pocket is reached, and then withdrawn in the same line as it was inserted, still with the explorer against the tooth. Under normal circumstances the side of the tooth will feel smooth and hard, and the fingers holding the explorer will not feel any interruption in the path the explorer takes when inserted and withdrawn from the gingival crevices. In this way the fingers will feel variations in the anatomy of the root surface which have to be interpreted.

Knowledge of Subgingival Conditions Essential—It is the interpretation of these sensations which is so essential to the understanding of the abnormalities which may exist below the gingival margin. For until the findings can be interpreted it will not be possible to institute correct treatment. In some cases no treatment is indicated.



1.
The double-ended Cross calculus explorer. The rounded 0.5 millimeter working end of this instrument is the part which is passed flat along the surface of the tooth.

Author's Note: Gratitude is extended to D. Lane, Artist and Photographer, the Faculty of Dentistry, University of Manitoba, Winnipeg, Canada, for his cooperation in making the illustrations for this article.

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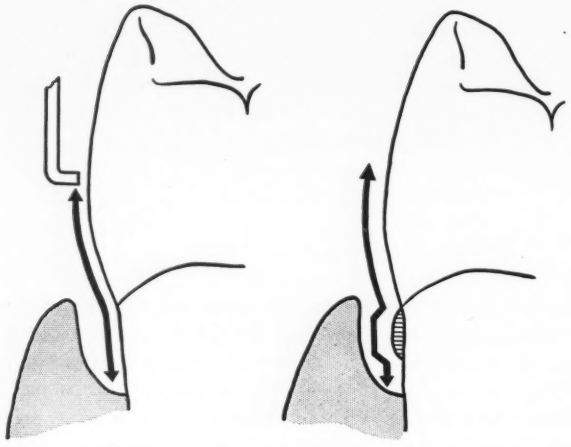
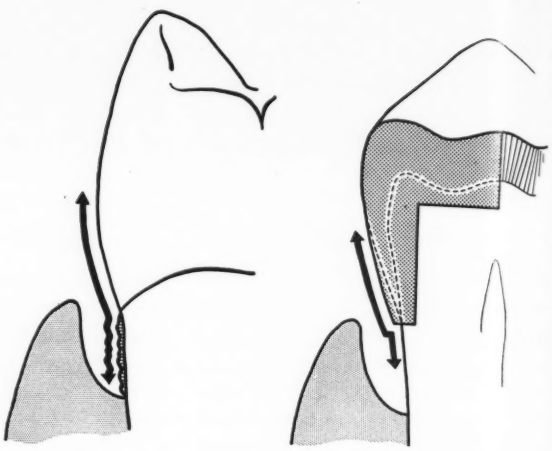
**Manufactured by Claudius Ash & Sons Co., Ltd., England. Supplied in the U.S.A. by Claudius Ash Sons & Co., U.S.A., Inc., 2730 Pine Avenue, Niagara Falls, N. Y.

[1]Cross, W. G.: A Periodontal Diagnostic Instrument, British D. J. **94**:187 (April) 1953.



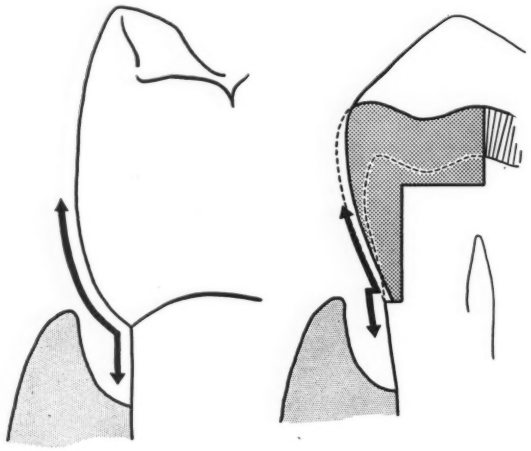
2.
Shows the path the explorer will follow when passed along the side of a tooth to the base of the gingival crevice. If there is no pathologic condition present, this will be a smooth path, both on insertion and withdrawal of the instrument.

3.
The path taken by the Cross explorer both on insertion and on removal from a pocket, when there is subgingival calculus on the root.



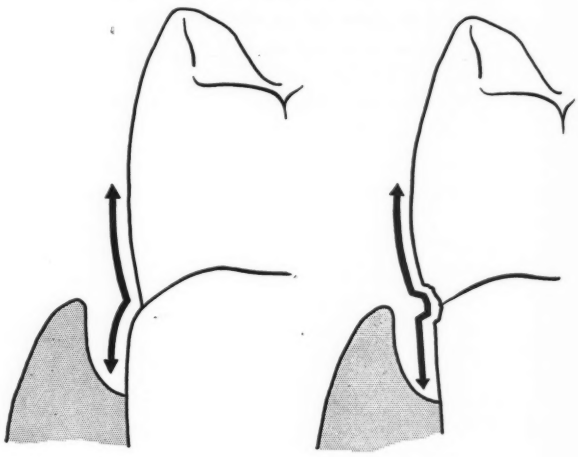
4.
Instead of a definite interruption to the insertion of an explorer along the root surface as shown in Figure 3 there is a gritty sensation as the face of the explorer passes over fine subgingival calculus.

5.
An interproximal restoration showing an overhanging gingival margin. This situation is often confused with that of subgingival calculus deposits.



6.
A large crown and narrow root is an anatomic variation which will convey nearly the same sensations to the explorer as those illustrated in Figure 5.

7.
The reverse situation to that shown in Figure 5; a deficient restoration at the gingival margin.



8.
A rare anatomic variation: the existence of a small crown with a large root present.

9.
A cavity below the gingival margin or erosion will transmit similar sensations to the explorer.

The various sensations possible to encounter were well described by Hirschfeld.[2]

Interpretation of Signs

Calculus—When the explorer passes down the root surface and has to move laterally to overcome an object and then moves back onto the tooth surface until the bottom of the pocket is reached, the object interrupting the smooth path is calculus. The same sequence of sensations will be felt as the explorer is withdrawn from the pocket (Fig. 3). Smaller deposits of subgingival calculus can be felt as a fine grit on the root surface, quite different to the feel of a hard smooth clean cementum (Fig. 4).

Overhanging Restoration, Large Enamel Crown—If either of these situations exist, the explorer will pass down the side of the tooth and then suddenly dip in onto the root surface and continue in the same place to the bottom of the pocket. On removing the explorer from the pocket, and still

[2]Hirschfeld, L.: Subgingival Curettage in Periodontal Treatment, JADA **44**:301 (March) 1952.

keeping the edge of the instrument against the tooth, it will have to move laterally to overcome the interference. On further removal it will stay in the same line of withdrawal (Figs. 5 and 6).

Deficient Restorations at the Gingival Margin, Large Roots, and Small Crowns—When this type of situation exists, the explorer will pass down the side of the tooth and will have to pass laterally before being moved to the base of the pocket without further interruption. On withdrawal, the explorer will move along the root without deviation and then pass inward onto the tooth as it encounters the deficiency at the edge of the restoration or the cement enamel junction (Figs. 7 and 8).

Caries and Erosion—These lesions transmit a different sensation to the probe when it is passed apically along the crown and then the root. Here the explorer will dip in and then come out again to pass along the tooth surface to the base of the pocket. When the explorer is withdrawn, the same sensations will be felt again, a dip into the tooth and then out again as the instrument is withdrawn from the pocket (Fig. 9).

Summary

1. The necessity for practitioners to locate subgingival calculus is emphasized.

2. The Cross calculus explorer is an instrument especially designed for this purpose and its method of use is described.

3. The clinical signs which may be found with this instrument are discussed.

4. Clinical signs which may be encountered are interpreted and illustrated.

University of Manitoba

Announcement of Books Received

ENDODONTICS, By Harry J. Healey, A.B., D.D.S., M.S.D., St. Louis, C. V. Mosby Company, 1960. Price $7.50.

PRACTICAL ORTHODONTICS, By George M. Anderson, D.D.S., ed. 9, St. Louis, C. V. Mosby Company, 1960. Price $8.00.

THEORY AND PRACTICE OF CROWN AND BRIDGE PROSTHODONTICS, By Stanley D. Tylman, A.B., D.D.S., M.S., and Stanley G. Tylman, B.S., D.D.S., ed. 4, St. Louis, C V. Mosby Company, 1960. Price $17.50.

THE PHYSIOLOGY OF THE MOUTH, By G. Neil Jenkins, M.Sc. (Liverpool, Ph.D. (Cantab.), ed. 2, Springfield, Illinois, Charles C Thomas • Publisher, 1960.

THE MICROBIAL FLORA OF THE MOUTH, By K. A. Bisset, D.Sc., and G. H. G. Davis, Ph.D., Springfield, Illinois, Charles C Thomas • Publisher, 1960, Price $5.50.

RADIATION PROTECTION AND DENTISTRY, By Arthur H. Wuehrmann, D.M.D., St. Louis, C. V. Mosby Company, 1960. Price $6.50.

MEDICAL AND DENTAL ASPECTS OF FLUORIDATION, By W. A. Cannell, M.R.C.S., L.R.C.P., D.P.H., R.C.S., Brooklyn, New York, Dental Items of Interest Publishing Company, 1960. Price $3.75.

CLEFT LIP AND PALATE REHABILITATION, By William H. Olin, D.D.S., M.S., Springfield, Illinois, Charles C Thomas • Publisher, 1960.

HEALTH vs. DISEASE, By Melvin E. Page, D.D.S., and H. Leon Abrams, Jr., St. Petersburg, Florida, Page Foundation, Inc., 1961. Price $5.00.

A HANDBOOK OF DIFFERENTIAL ORAL DIAGNOSIS, By Major M. Ash, Jr., B.S., M.S., D.D.S., St. Louis, C. V. Mosby Company, 1961. Price $6.50.

SURVEY OF DENTISTRY, By Byron S. Hollinshead, Director, Washington, D.C., American Council on Education, 1961. Price $10.00.

ORAL PHYSIOLOGY, By Sidney I. Silverman, B.S., D.D.S., St. Louis, C. V. Mosby Company, 1961. Price $15.00.

REVIEW OF DENTISTRY, By Maynard K. Hine, D.D.S., M.S., ed. 3, St. Louis, C. V. Mosby Company, 1961. Price $9.00.

SYNOPSIS OF ORAL PATHOLOGY, By S. N. Bhaskar, B.D.S., D.D.S., M.S., Ph.D., St. Louis, C. V. Mosby Company, 1961. Price $9.75.

BONE HOMOGRAFTS IN THE SURGICAL TREATMENT OF CYSTS OF THE JAWS AND PERIODONTAL POCKETS, By Heyman Kromer, Oslo, Norway, Oslo University Press, 1960. Price $7.50.

MANIFESTATIONS A DISTANCE D'ORIGINE BUCCO-DENTAIRE, By M. Lepoivre, and J. Raison, Paris, Julien Prelat, 1961. Price 32 NF.

APPLIED DENTAL ANATOMY, By Nicholas J. Brescia, D.D.S., M.S., St. Louis, C. V. Mosby Company, 1961. Price $7.50.

CONGENITAL ANOMALIES OF THE FACE AND ASSOCIATED STRUCTURES, Compiled and edited By Samuel Pruzansky, D.D.S., M.S., Springfield, Illinois, Charles C Thomas • Publisher, 1961.

LOCAL ANESTHESIA AND PAIN CONTROL IN DENTAL PRACTICE, By Leonard M. Monheim, B.S., D.D.S., ed. 2, St. Louis, C. V. Mosby Company, 1961. Price $8.75.

ORTHODONTICS, PRINCIPLES AND PRACTICE, By T. M. Graber, D.D.S., M.S.D., Ph.D., Philadelphia, W. B. Saunders Company, 1961. Price $18.50.

FRACTURE DE L'ANGLE MANDIBULAIRE ET DENT DE SAGESSE, By M. Trevoux, D.M.D., Paris, Person, Editeur, 1961.

A COMPREHENSIVE REVIEW OF DENTISTRY, By Vincent R. Trapozzano, D.D.S., ed. 3, Philadelphia, W. B. Saunders Company, 1961. Price $10.50.

The EDITOR'S *Page*

ANY STUDY made to determine attitudes of the public to various experiences would probably reveal that the dental experience rated among the least desirable. The anxiety, fear, apprehension (all forms of psychic tension) that are associated with dental treatment are out of proportion to the actual physical threat that is involved. People who face life-endangering surgical procedures or medical emergencies with equanimity are often sorely disturbed before or during a dental appointment. It is not known why dental operations are more traumatic to the psyche than are many other medical experiences.

Although dentists have always wanted the tools to control apprehension and prevent pain these aids have not always been at hand. Not until engineers and pharmacologists applied their skills to the problems were solutions found. The engineers, under the prompting and encouragement of dentists, developed the high speed tooth-reducing machines and the anesthesia apparatus that have helped reduce pain in dental operations. The pharmacologists have given the dental profession the drugs to allay anxiety and to control pain. Dentists and their patients who use these drugs are indebted to the engineers and pharmacologists. These are examples of cooperation among the professions.

A recent book by Monheim is admirable for the review of basic anatomy involved in local anesthesia, for the techniques of injection that are described and illustrated, and for a presentation on preanesthetic medication and postoperative pain control.[1]

The purpose of preanesthetic medication is to: 1) Allay fear and apprehension; 2) reduce the toxic effects of local anesthetic agents; 3) raise the pain threshold. The barbiturates are effective drugs for these objectives. The meprobamates and other newer ataractic tranquilizing drugs are being widely used on prescription by dentists. These drugs potentiate the effectiveness of the hypnotics, sedatives, narcotics, and analgetics.

The postoperative control of pain in dental practice is usually accomplished with the analgetics. The salicylates and paraminophenols (acetanilid and acetophenetidin) are available in many excellent formulas. The narcotic that is most commonly used is codeine (15 to 60 milligrams) either as the phosphate or sulfate salt or in combination with acetylsalicylic acid, acetophenetidin, caffeine, or other drugs. The synthetic narcotic or opioid meperidine (Demerol®) in 50- to 100-milligram dosage is also effective to control pain. The prescription of all narcotics requires a federal narcotic stamp.

There is no conflict between the role of the dentist and the role of the physician in the treatment of disease or in the use of drugs. Beckman[2] has stated the facts clearly:

"The dentist who has some understanding of problems encountered in other medical specialties than his own is likely to be not only a better dentist but a happier man. . . . The positions of both dentists and medical men in the battle against disease could be made of reciprocal strategic importance if the training of both groups were sufficiently altered to enable students in each to be alerted to the opportunities and activities of the other. . . .

"Pain occupies a unique place in dentistry. In medical practice it is often the thing that brings the patient into the office, whereas in dental practice it, or rather the fear of it, may postpone the visit almost indefinitely. The dentist's position with regard to pain is further distinguished by the fact that not only are all of his operative procedures performed on tissues well supplied with afferent pain fibers, but he must often operate when the tissues are in an inflamed and hypersensitive state. Furthermore, the patient may have been suffering for several days and be in a state of cerebral fatigue that enhances pain.

"It is important that you understand the use of analgesic and sedative drugs in order to ease many situations for both the patient and yourself."

Every dentist will agree with this philosophy.

[1]Monheim, Leonard M.: Local Anesthesia and Pain Control in Dental Practice, ed 2, St. Louis, C. V. Mosby Company, 1961.

[2]Beckman, Harry: Pharmacology in Clinical Practice, Philadelphia, W. B. Saunders Company, 1952.

MEDICINE and the Biologic Sciences

Transfusion of Cadaver Blood

Properly selected cadaver blood is safe for transfusion to human beings and possesses some advantages over living donor blood: (1) It safeguards against transmission of disease. (2) Natural fibrinolysis in cadaver blood permits transfusions without citrate. (3) Since a cadaver yields several liters of blood, a patient may be transfused with large quantities of blood from a single donor.

Cadavers are most suitable for this purpose when death has been sudden. Cadavers are not suitable after death from open trauma because blood flowing from damaged tissues creates danger of infection.

For withdrawal of the blood the cadaver is placed in extreme Trendelenburg position to facilitate gravity flow of blood. To withdraw the blood, the left jugular vein is severed and 2 cannulas are inserted, one toward the heart and a U-shaped one cephalad. The free ends are connected by rubber tubing to sterile receptacles.

An adult cadaver yields 2 to 3 liters of undiluted blood. With the cadaver in a horizontal position, 1,000 cubic centimeters of glucose phosphate solution is introduced through the carotid artery. The cadaver is replaced in Trendelenburg position, and 2 liters of diluted blood is then obtained.

Tracer studies show that blood withdrawn from cadavers never includes that which flows from the intestines to the portal system or from the parenchyma of the lungs. Cadaver blood requires no citrate because in persons dying suddenly, the blood does not coagulate or initial clots dissolve rapidly and remain liquid. For every 250 cubic centimeters of blood, 25 cubic centimeters of glucose phosphate solution with antibiotics is added to preserve the blood twenty-five to thirty days.

The blood is cultured and a thick drop is examined for malaria. Hemoglobin, cholesterol, and Rh factor are determined. In some cases, the blood is analyzed for latent hemolysis and erythrocyte fragility. A thorough postmortem examination is also performed to assure that the blood is safe.

Morphologic and biochemical composition of stored cadaver blood differs little from that of blood from living donors. Blood sugar is higher after sudden death than the normal level in living beings, 600 to 900 milligrams per cent. Phosphate and urea are also high. Amino acid content is also close to the level found in living donors.

Immediately after transfusion, cadaver blood functions as any other carrier. The oxygen-carrying capacity of the erythrocytes is preserved in the cadaver for six to eight hours after death. Leukocytes retain phagocytic function for ten hours. Therefore, it is prudent to withdraw the blood within six hours after death.

Petrov, B. A.: Transfusion of Cadaver Blood, Surgery **46**:651-655 (*June*) 1959.

Cancer of the Breast

The most important factor influencing the prognosis of breast cancer is probably the extent of the spread of the tumor. A uniform system of staging, based on clinical rather than histologic examination, should be adopted for comparison of results.

The following classification is acceptable:

Stage I: Disease apparently localized and operable; axillary nodes not palpable.

Stage II: Disease localized and operable; axillary nodes palpable. Lesions with skin ulceration are not placed in this category.

Stage III: Disease localized but too far advanced to be operable; axillary nodes may be fixed, skin lymphatics invaded, and supraclavicular nodes involved.

Stage IV: Distant metastasis has occurred.

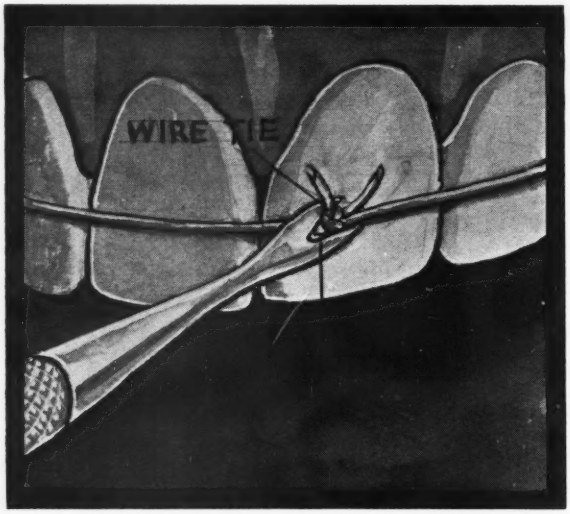
Prognosis is about twice as good for lesions 1 centimeter in diameter as for lesions 12 centimeters in diameter. Large tumors are more often associated with metastasis. Size is not correlated with the duration of the disease as reported by the patient because the growth is often not detected until relatively large.

The rate of growth of a tumor follows an exponential curve. As the tumor grows larger, diameter increases more rapidly even though rate of cell division is not altered. The period before the tumor grows large enough to detect is always longer than the period from detection until death if the tumor is untreated.

Survival rate is lower for elderly patients and for women under 40 years of age than for those in the intermediate age group. Greater frequency of intercurrent disease and general debility are largely responsible for poorer results in old patients. Young patients, on the other hand, are often incorrectly advised by physicians. Because 10 per cent of breast cancers occur in patients under 40 years of age, any lump in the breast should be regarded as cancer until removed and proved otherwise. Prognosis of breast cancer is worse in men than in women. Diagnosis is often made late. The tumor usually becomes fixed to the chest wall early in the course of the disease.

The degree of differentiation of tumor cells influences outcome. In assessing the prognosis histologic type

(*Continued on page* 490)



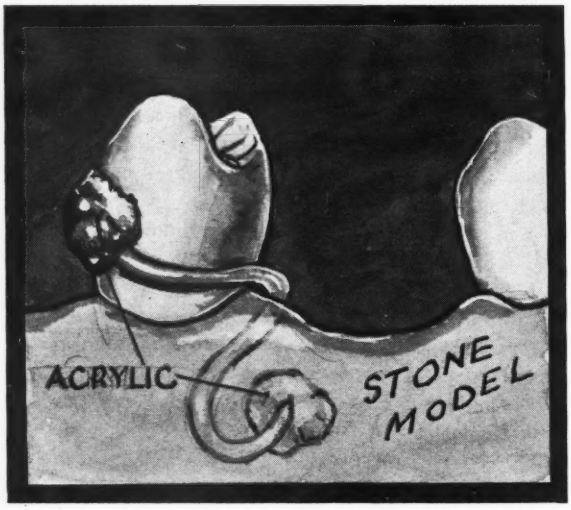
1

Clinical and Laborator

Twisting Ends of Orthodontic Wires

Adrian N. Spitz, D.D.S., Brooklyn, New York

1. Cut a notch in the end of a flat instrument. Place the notch over the twisted ends of orthodontic tie wires and use the instrument to tuck the ends of the wires into the interproximal spaces or under the arch wire.

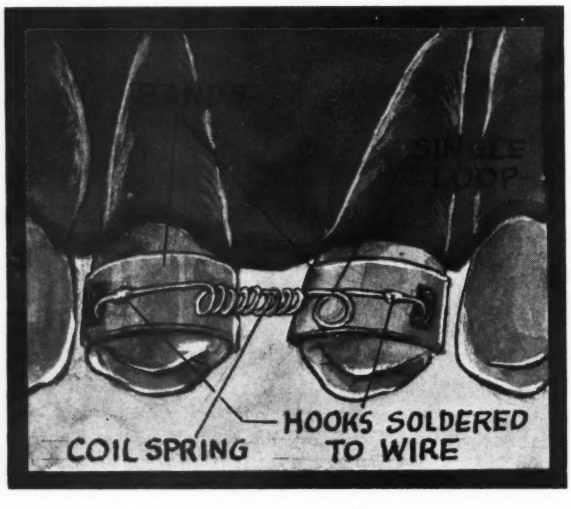


2

Securing Wrought Wire Clasps

James E. Hage, D.D.S., U.S.A.F. (DC), Altus, AFB, Oklahoma

2. Place a drop of self-cure acrylic on the tip and at the base of the clasp to secure the clasp in proper position during processing.



3

To Close Space Between Teeth

Harry L. Aronson, D.D.S., Chicago, Illinois

3. Make a coil spring from a 010 wire. Temper the wire. Solder or spot weld hooks on the orthodontic bands. Create a single loop at one end of the coil spring. Use a hooked instrument to tighten progressively this single loop.

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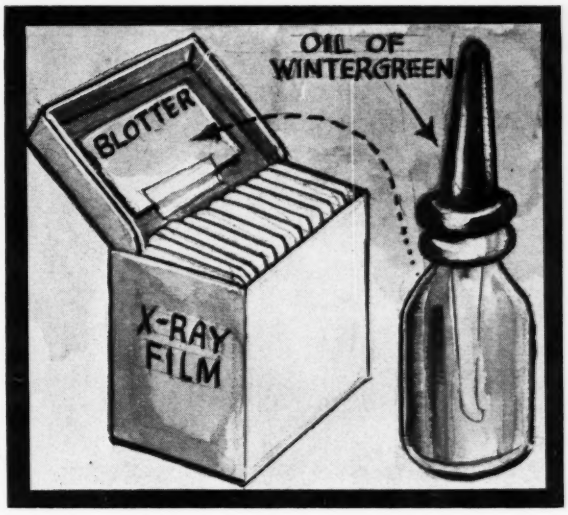
Robert H. Goodhart, D.D.S., Cheltenham, Pennsylvania

4. Place a piece of blotting paper in the container that holds the film. The blotter should not touch the film. Moisten the blotter with 12 drops of wintergreen.



4

To Expedite Cementation

William Robbins, D.D.S., San Francisco, California

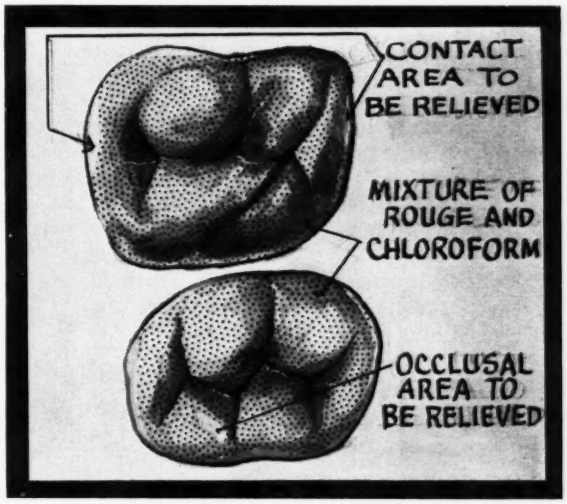
5. Immediately before cementation coat the external surfaces of the crown or inlay with oil. The oil will prevent the adherence of the cement to the external surfaces. Do not allow the oil to touch the internal surfaces.

5

Fitting a Gold Casting

Laurence Wiland, D.D.S., Flushing, New York

6. Use a brush to paint a solution of chloroform and polishing rouge on the contact areas and occlusal surfaces of the castings. Areas that require relief before cementation will be exposed.



6

volved; and jot down the advantages of the technique. This shouldn't take ten minutes of your time. Turn to page 494 for a convenient form to use.

Send your ideas to Clinical and Laboratory Suggestions Editor, DENTAL DIGEST, 708 Church Street, Evanston, Illinois.

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Twenty rats, in groups of four, are used in this modification of the method described by Davies *et al.*[1] The pain stimulus is provided by a heated resistance wire placed near the rats' tails. Direct contact with the hot wire is prevented by a specially designed water-cooled tail rest. Observers record the time interval that animals take to respond (tail jerk) to the heat stimulus.

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1. Davies, O. L., Raventos, J., and Walpole, A. L.: Brit. J. Pharmacol., 1:255, 1946.

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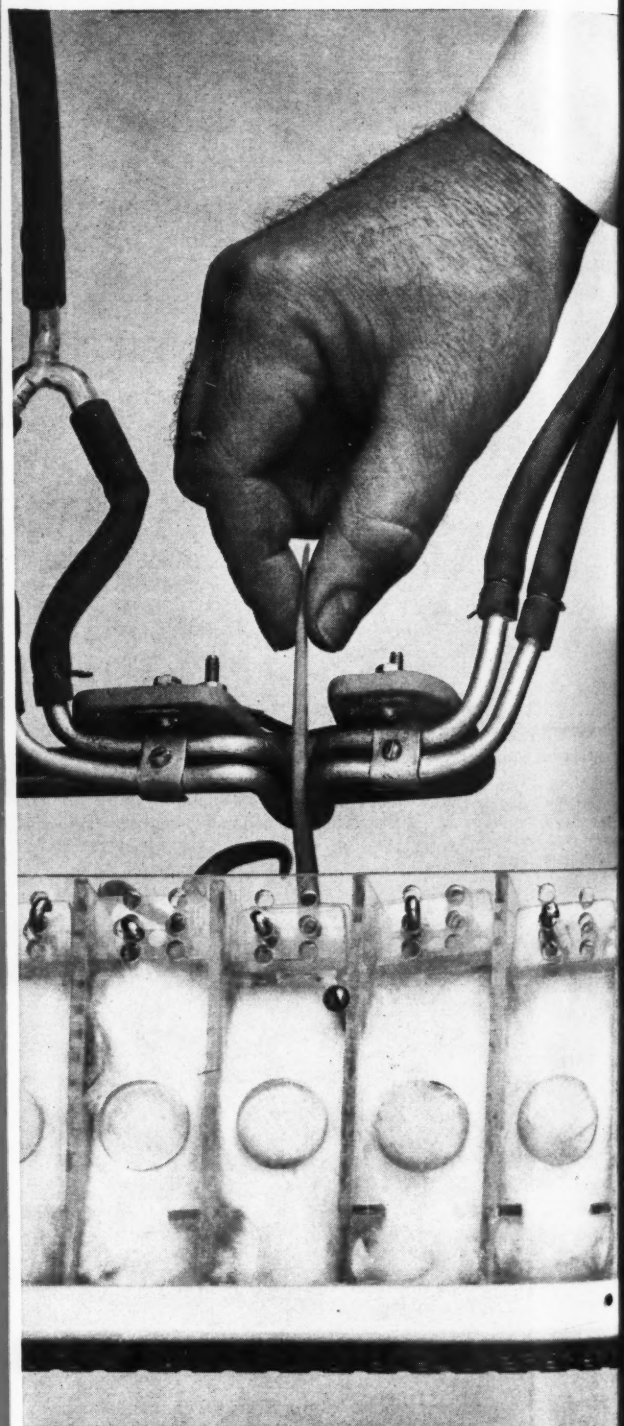

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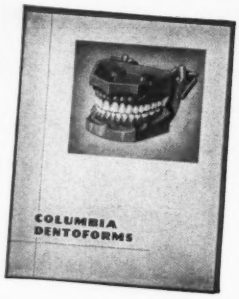

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should be considered together with the extent of spread. The survival rate in patients who delay operation for a year or longer after diagnosis may be equal or superior to rate in those patients who do not delay. This is explained by the fact that a tumor which is still operable after a year's delay is relatively benign and slow growing and does not indicate that treatment is without effect on the course of disease. Attainment of ten-year survival rates of over 50 per cent in young patients, who are little affected by intercurrent disease, shows that treatment does alter prognosis.

Method of therapy also influences survival. For many patients, radical mastectomy is inadequate treatment; for others, the operation is not technically possible. Whether radiation or surgical treatment of the internal mammary nodes is superior is not known. Radiotherapy is effective and causes less morbidity than surgical removal of the supraclavicular nodes. Ovarian irradiation as part of initial treatment does not influence prognosis to any marked degree.

McWhirter, Robert: Some Factors Influencing Prognosis in Breast Cancer, J. Faculty Radiologists, London **8**:220-234 (*April*) 1957.

Prostatic Cancer

Only about 5 per cent of patients with prostatic carcinoma are seen early enough so that a radical prostatectomy may be done with a hope for cure. The disease is not always relentlessly progressive, however, and may be controlled for long periods of time.

Patients may live a normal life span and die of other causes while harboring prostatic carcinoma. With appropriate therapy, a five-year survival rate of over 53 per cent may be expected among patients with low-grade cancers.

The methods of treatment include transurethral resection, irradiation therapy, hormone therapy, and castration. Periodic examinations will permit execution of different therapeutic maneuvers at the time that the greatest benefit may be derived. Frequent observation also allows early diagnosis of diseases of other organs; also worries and apprehensions of the patient may be appeased. When a small prostatic nodule is detected in a patient under 70 years of age, biopsy is advisable unless possible benefits are precluded by other findings, such as distant metastasis.

If carcinoma of the prostate is no larger than the tip of the small finger, radical prostatectomy is curative in approximately 50 per cent of instances. A few patients refuse operation because sexual impotence will result. In such cases, x-ray therapy is employed. The tumor may remain quiescent or grow only slowly.

When the prostatic nodule is larger than the thumbnail and is attached to the surrounding tissue, the likelihood of cure by radical prostatectomy is remote. When urinary obstruction is associated, transurethral resection is performed. Resection sometimes amounts to little more than biopsy.

(*Continued on page* 493)

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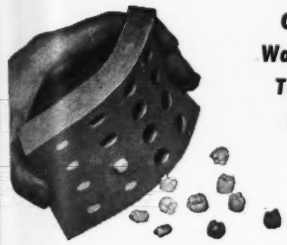

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only a few pieces of tissue being excised.

About 20 per cent of patients have metastatic lesions when seen for the first time by the urologist. Pain in the spinal column may precede, by several months, roentgen signs of bone involvement. Most patients with metastasis have hard and enlarged prostate glands and urinary obstruction.

Patients in the terminal phase of carcinoma of the prostate gland may be kept comfortable for many months by judicious selection of therapeutic measures. Urinary obstruction may be relieved by repeated transurethral resections. Painful areas of metastasis may be treated by spot roentgen ray therapy. Improvement in general health by supportive measures such as transfusions may also temporarily halt the downhill course.

Thompson, Gershom J.: Long-Term Control of Prostatic Cancer, S. Clin., North America **39**:963-971 (June) 1959.

Scleroderma

Scleroderma is a chronic disease characterized by fibrous thickening of the dermis and the connective tissue of various internal organs. The viscera are often affected. The disease is not rare and the peak incidence is in persons between the ages of 30 and 50 years. It is more frequent in women than men, and usually the course is slowly progressive.

It appears that the etiology is obscure. There is no evidence to support the concept of hypersensitivity. The presence of a psychologic component, however, is in most cases of interest.

Most sections of the skin appear normal early in the disease. As the condition progresses, the dermis is thickened by coarse collagen bundles lying parallel to the surface of the skin. This fibrous deposit frequently extends into the subadjacent adipose tissues. Eventually, hyalinization may occur with loss of all skin appendages. Calcification in the skin is not uncommon. Fibrosis commonly occurs in other organs including the alimentary tract, myocardium, lung parenchyma, and muscle.

In autopsy, vascular lesions involving small arteries and arterioles are found in most cases. The kidney is the most frequent site. The lesion may be chronic, with marked intimal fibrosis or it may be acute, with deposition of fibrin-like material beneath the endothelium.

Usually the onset is characteristically insidious. Stiffness of the fingers and hands may be an early complaint. Raynaud's phenomenon and hyperhidrosis of the palm and soles may antedate other manifestations by months or years. The earliest lesions of the skin are usually found in the hands or feet and less commonly in the face and neck. These consist of a diffuse, nonpitting edema, usually without erythema. The involved skin becomes waxy, taut, hard, thickened, and finally bound firmly to the underlying structures. Normal skin folds disappear, producing a mask-like effect in the face.

The process may then spread centrally from the distal parts of the extremities and involve the entire integument. Ulcers, difficult to treat, appear on the fingertips and at pressure points over joints. Dysphagia and sour eructations due to esophageal involvement are common and may precede skin involvement. Renal involvement with uremia and malignant hypertension is a common terminal event.

Blood studies give normal results except during periods of active disease. At this time the erythrocyte sedimentation rate is elevated and the serum protein content altered with a reversal of the albumin:globulin ratio.

A prolonged, progressive course of many year's duration is the rule. In some cases death results from renal involvement with rapidly advancing malignant hypertension or from pulmonary or cardiac dysfunction.

Special Article: Primer on the Rheumatic Diseases, JAMA **171**: 1345-1356 (*November* 7) 1959.

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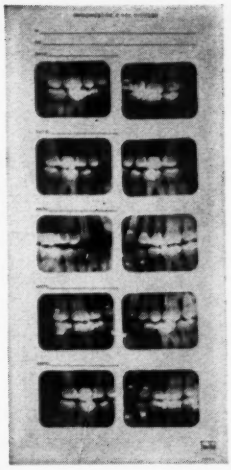

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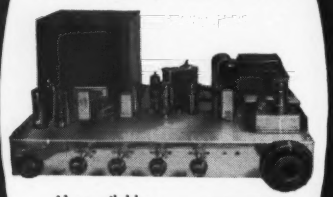

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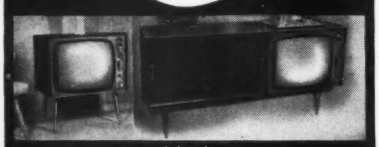

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Contra-Angles

The Fruits of Boredom

FOR MOST PEOPLE nothing is worse than inactivity. The chap who receives a gold watch on the day that he retires from work and then gives a trite little speech on how he will spend his leisure in fishing (or golf, or gardening, or travel, or playing the banjo) fools no one.

It depends on the boredom quotient or threshold to determine how much time anybody can spend making a career of recreation. Some people bore more easily than others. I am one.

Recreation is exactly what the word suggests: a method of recharging the human batteries to prepare a person to return to work. It is not an end in itself. Perpetual recreation leads to boredom and often to mischief. The playboys of the world are miserable examples of dislocated recreation; the searchers who never find.

The dentist is fortunate that he has no compulsory retirement age inflicted upon him by company policy or government regulation. The dentist can continue to work as long as his skills survive and his body is able. People will continue to patronize the older dentist so long as he gives the appearance of physical and mental soundness. He may not, however, expect an outpouring of "new" patients.

In the early days of this century leisure was no social problem. People worked from dawn to darkness—on the farm, in the shop, in the home. The dentist usually had evening office hours. Automation was no threat. Most work was done by hand or with crude machines. Few people could afford the luxuries of recreation. Physical exertion was the most potent tranquilizer.

Labor-saving devices and gadgets to promote comfort were unknown. The first steel plow or mechanical

(*Continued on page* 502)

CLINICAL AND LABORATORY SUGGESTIONS

(*See pages* 486 *and* 487)

Forms to be Used by Contributors

To: Clinical and Laboratory Suggestions Editor

DENTAL DIGEST
708 Church Street
Evanston, Illinois

From:_____

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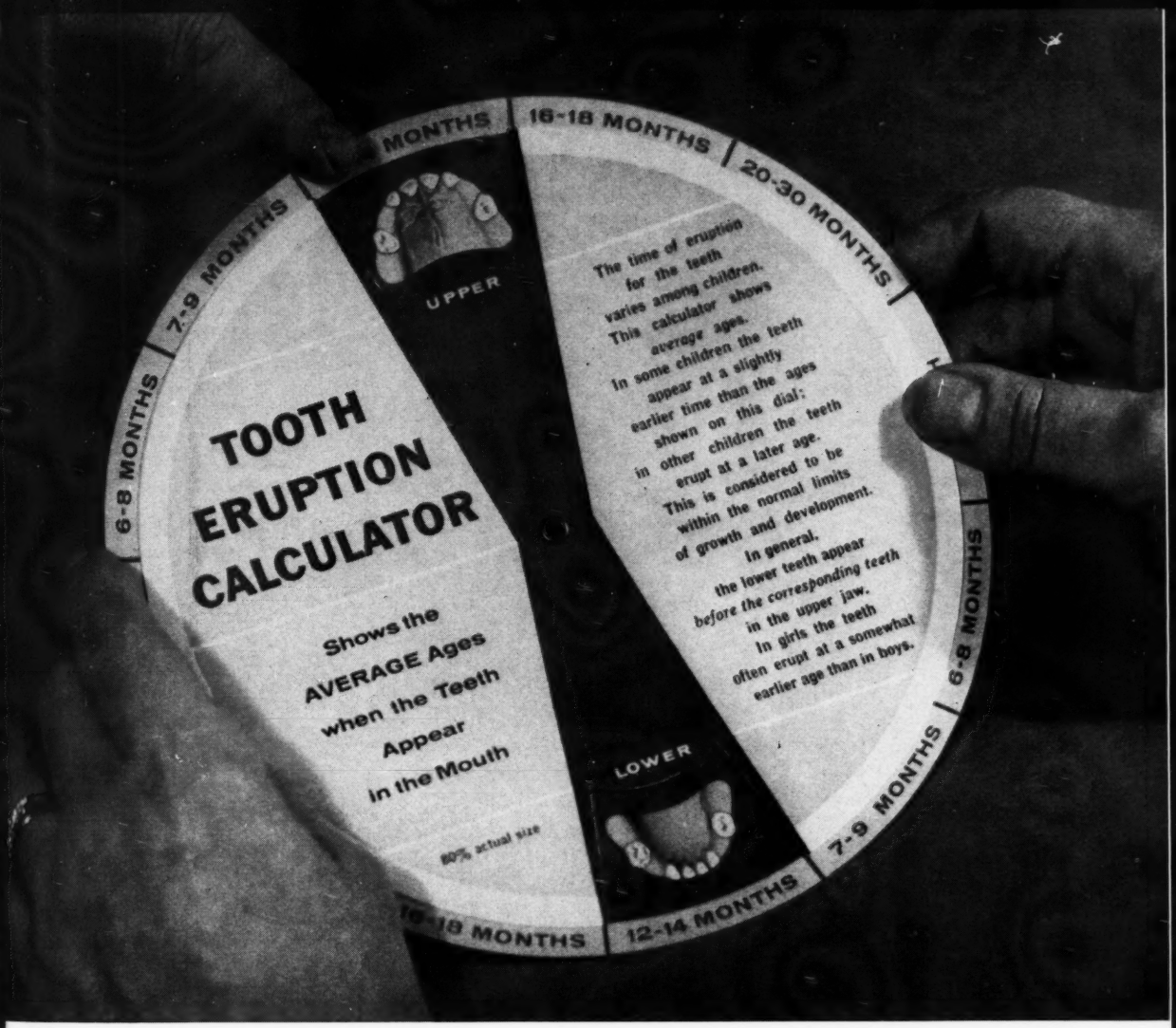
Subject_____

Explanation of Procedure:

Sketch:

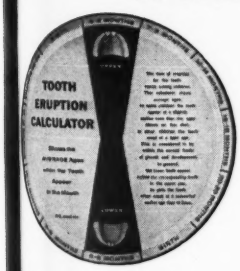
Suggestions submitted cannot be acknowledged or returned.

$10 will be paid on publication for each suggestion that is used.

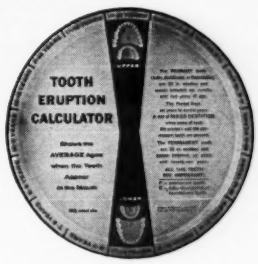

6-8 MONTHS
7-9 MONTHS
UPPER
16-18 MONTHS
20-30 MONTHS
TOOTH ERUPTION CALCULATOR
Shows the AVERAGE Ages when the Teeth Appear in the Mouth
60% actual size
The time of eruption for the teeth varies among children. This calculator shows average ages. In some children the teeth appear at a slightly earlier time than the ages shown on this dial; in other children the teeth erupt at a later age. This is considered to be within the normal limits of growth and development.
In general, the lower teeth appear before the corresponding teeth in the upper jaw. In girls the teeth often erupt at a somewhat earlier age than in boys.
LOWER
6-8 MONTHS
7-9 MONTHS
12-14 MONTHS
16-18 MONTHS

What Every Parent Should Know—

about his child's teeth



The *first* tooth is a family triumph! . . . Each succeeding tooth, to the total of 52, should be of major interest to parents . . . *Show* parents on a dynamic time-wheel *what* teeth should appear *where* and at *what* time.



Actual size 7¾" diameter

The TOOTH ERUPTION CALCULATOR shows the dental development from birth to adulthood—when all the teeth are due for appearance in the mouth.

Although there are 44 separate views of the child's mouth on this chart, parents will not find it confusing, for only the two (or four—in the case of mixed dentition) which apply to a certain age level are visible at one time. The dials (one on each side of the two-sided chart) rotate to show upper and lower teeth through 14 stages of development.

Every dentist and physician will want the TOOTH ERUPTION CALCULATOR in his office to demonstrate tooth development to the parents of children.

Every dentist and physician will also want the TOOTH ERUPTION CALCULATOR to give to parents for home use and patient education.

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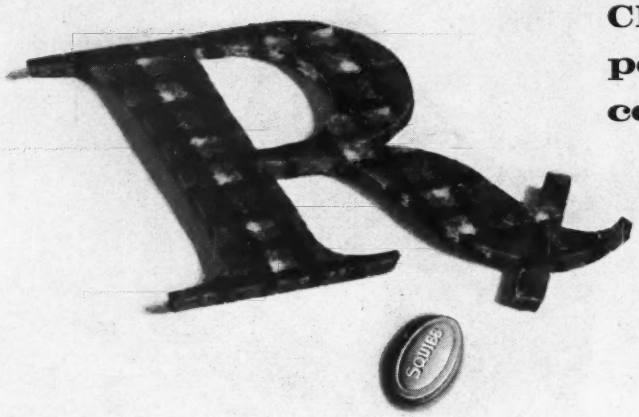

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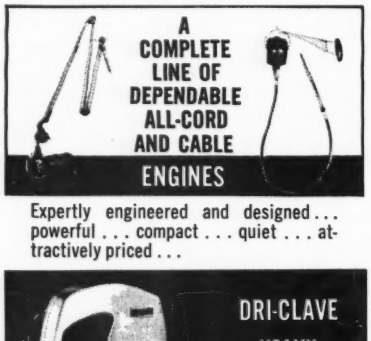

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grain reaper, the first coal furnace or hand-powered washing machine promised to help free men and women from some forms of their drudgery. This new freedom came and brought forth the increase in the degenerative diseases and the need for sedation from alcohol, tobacco, or drugs.

We have not many social philosophers. The few that we have are largely ignored when they speak or write on social subjects. Whoever ventures a judgment on values is likely to find himself talking to himself, or cast in the part of a crackpot or killjoy. People resent being told that they are not quite perfect: that they eat, drink, smoke too much; that they relax and exercise too little.

Retirement from work, leisure, the softer life are medical problems. There are not many physicians who are concerned with these issues. The physician is skewered in the same pinwheel as the rest of us. The merry-go-round of hurry, worry, and indecision whirls all of us around.

The editor of *Medical Science* (Mark D. Altschule, M.D.) is one physician who sees the hazard in boredom:

"The medical aspects of the leisure problem actually involve the problem of boredom. Boredom is at least a contributory factor in the genesis of many different types of antisocial behavior ranging from familial discord, alcoholism, and drug addition to delinquency and major crime. All physicians agree that the first three are medical problems and many believe that the last two may be.

"Although the psychiatric aspects of boredom have never been thoroughly explored, certain facts are known. One is that the brain needs input: Experiments on sensory deprivation show that such deprivation at first causes anxiety and then if sufficiently protracted and marked, depersonalization and hallucinations. Even in everyday life physicians have the opportunity to observe how protracted boredom produces increasing restlessness, tension, and, in some persons, anxiety. Many physicians have also observed how boredom causes deterioration in the elderly. . . .

"Current theories about elementary and high-school education have, if anything, increased the problem of boredom. These theories are more concerned with enabling each student to get along with others than with enabling him to get along with himself. Everyone agrees that it is nice to be nice because people are only human; however, the purpose of education should be to stimulate the individual to develop as an individual and not as a member of an ant-hill.

"The American people of the future should not be doomed to spending their increasingly long hours of enforced leisure sitting in front of an idiot-box; although this would undoubtedly please the manufacturers of television sets, it otherwise has nothing to recommend it. The medical profession has a strong interest in preventing the untoward effects of the idleness that seems to be the inevitable fate of the American people in the near future. The problem is important and will become increasingly so in the next decade. It will not be an easy one to solve, and it therefore demands immediate study."

I know many dentists who have retired. Those who were compelled to give up practice because of ill health are in a separate category, like anyone else who is forced into inactivity. Their plight is a fate that can strike any of us—early or late.

The dentists who retire by choice—to fish, to hunt, to golf, to travel—are usually an unhappy lot. They fit the description by Doctor Altschule: restless, tense, anxious. I suppose there are exceptions and that there are dentists living in happy retirement. Some day I hope to meet one.

Bits of Medical Intelligence

• A British physician wrote a letter to the editor of a medical journal to advance the theory that lung cancer has increased in direct proportion to the uses of the electric razor. His theory is that the cuttings from the beard are inhaled and act as chronic irritants to the lung tissue.

• A father reports with chagrin that he swallowed his son's tooth. The ex-

(*Continued on page* 505)

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ELECTRODEPOSIT OF FLUORIDE

A MAJOR BREAKTHROUGH IN FLUORIDE APPLICATION

An effective new technique for increasing the amount and duration of fluoride adherence to tooth enamel is now available to the dental profession following extensive basic and clinical research by leading universities and dental research investigators.

Development of the method began when various investigators focused upon the basic molecular structure of the fluoride ion.

One property of the fluoride ion was especially noteworthy. Of all the ions on the periodic chart of elements, fluoride is the most negatively charged, having a negative potential of —2.65.

This extreme negativity suggested the advisability of investigations into iontophoresis. It was reasoned that the extremely negative fluoride ion would be attracted to a positively-charged surface. If the tooth could be given a slight positive electrical charge, fluoride ions would deposit and be retained by the teeth. The process is as simple as electroplating.

Dentistry has long made use of this technique with low voltage electrical charges to penetrate iodides into root canals.

This line of investigation has recently produced a number of outstanding developments which unfold exciting possibilities in dental care.

RADIOACTIVE ISOTOPE STUDY CONFIRMS ION PENETRATION

The ability of electrical current to increase the penetration of negative ions into tooth enamel has been confirmed conclusively by a recent **in vitro** study[1] using radioactive iodide, an ion closely related to fluoride. Radioautographs revealed a striking increase in the degree of negative ion penetration when the teeth were exposed to a positive electrical charge of 1½ volts.

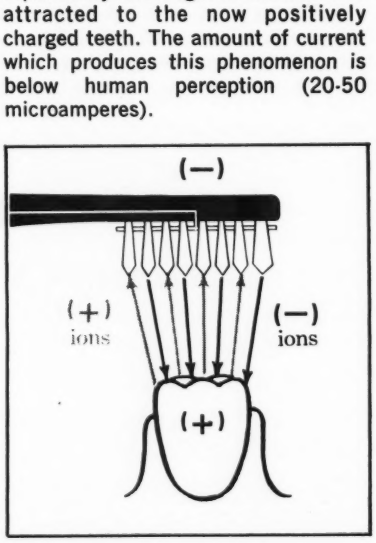
35% INCREASE IN RESISTANCE TO ACID DISSOLUTION

Using a topically applied fluoride solution another recent investigation[2] revealed a 35% average increase in resistance to acid dissolution of dental enamel when teeth **in vitro** were positively charged, as compared to an identical fluoride application without electrical current.

ELECTRODEPOSIT OF FLUORIDE IN DAILY BRUSHING

On the basis of these principles the Ion Toothbrush was developed to make possible the phenomenon of fluoride ion transfer during regular daily brushing.

This inexpensive instrument utilizes a 1½-volt penlite battery located in the handle to charge the teeth with a positive electrical potential. It is used with a standard fluoride dentifrice. The negative fluoride ions are repelled by the negative bristles and attracted to the now positively charged teeth. The amount of current which produces this phenomenon is below human perception (20-50 microamperes).



STUDIES SHOW ION TOOTHBRUSH IMPROVES ACID RESISTANCE 23%

In vivo studies[3] on rats using the Ion Toothbrush and a dentrifice which contained stannous fluoride showed a 23% increase in the resistance of tooth enamel to acid dissolution, as compared to normal brushing with the same dentifrice. The increased resistance to decalcification was achieved in only 12 days of brushing for one minute each time twice daily.

98% EFFECTIVE IN REDUCING HYPERSENSITIVITY

Clinical tests have been equally impressive.

In a double-blind clinical study[4] of hypersensitivity, electrodeposit of fluoride by the Ion Toothbrush alleviated 98% and completely relieved 70% of hypersensitive teeth studied in patients who had continuously experienced the condition for a period of five or more years.

Results occurred within two to six weeks. Patients used the Ion Toothbrush with a standard fluoride dentifrice, brushing for a period of three minutes twice each day.

The subjects reported a feeling of unusual mouth cleanliness and a marked improvement in gingival tone was noted by the investigator.

The Ion Toothbrush is now being recommended by many dentists to their patients with outstanding results.

[1]Stowell, Ellery C.: et al (V.A. Dental Research Dept.) Ion Penetration Through Teeth as Influenced by an Electrostatic Field. Presented before I.A.D.R., Boston, March 23-25, 1961.
[2]Bhatia, H., and Emmerson, C. C.,: University of Southern California, School of Dentistry, Department of Pedodontics, To Be Published.
[3]Bixler, David, D.D.S., PhD.,: Indiana University, Unpublished Report.
[4]Jensen, Arthur L., D.D.S., F.A.C.D.,: Tooth Sensitivity Controlled by Iontophoresis, J. Calif.S.D.A., Vol. 37, No. 1, Feb., 1961.

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foliated deciduous tooth was embedded in an ice cream bar that the father shared with the boy.

• In the "For Rent" columns of a small town newspaper this gem appeared: "Nice room for rent to a gentleman with gas."

"Leaders are Made—not Born"

An article under this title appeared in one of the last issues of the *United States Armed Forces Medical Journal.* This excellent publication was suspended with the December 1960 issue. I presume that economy was the motive although I can think of a dozen other places where economy in federal expenditures would be more important.

Brigadier General Robert B. Skinner, MC, USA gave 12 suggestions that cover the basic principles of leadership:

1) *Be yourself* — conscious imitation always defeats itself, is invariably evident, and usually does not serve the purpose intended

2) *Develop Equanimity or Self-Control*—it can be acquired

3) *Impartiality and Justice* — are not similar qualities, but are allied in their efforts

4) *Demand Results, not Methods*—many minds working independently toward the same objectives are likely to develop better methods than those prescribed from above

5) *Assume Loyalty Until Disloyalty is Proved*—argue with the "boss" before the decision is made, but once made it should be abided by and supported

6) *Avoid Mass Punishments and Threats*—the quality of leadership is almost inversely proportional to the number of orders issued

7) *Reward Good Service*—if only by a word or letter

8) *Give Reasons and Objectives*—everyone does a better job when he is told why something has to be done

9) *Courtesy and Sympathy* — are absolutely essential. Do not be afraid to be a gentleman

10) *Know Your Trade*—there is no substitute for knowledge and ability

11) *Strive for Humility*

12) *Believe in a Supreme Being*

As examples of men who showed their qualities of leadership General Skinner mentioned two Americans of the last century: Abraham Lincoln and Robert E. Lee. None of us in this century will disagree with these choices. —E. J. R.

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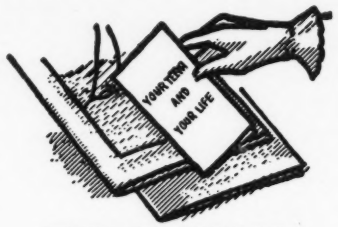

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